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PAPER

Generative AI in Academia: How Engineering Students Perceive and Approach Ethical Challenges

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ABSTRACT

Generative artificial intelligence (GAI) technologies have become increasingly prevalent in academic settings, offering students powerful tools for completing academic tasks. From drafting essays to solving complex problems, GAI enhances productivity and creativity, helping students streamline their learning. However, the rapid adoption of these tools raises essential ethical concerns regarding academic integrity, dependency, and the development of critical cognitive skills. This study explores how engineering students perceive and navigate the ethical challenges of GAI use in educational environments. Through a combination of quantitative survey data and qualitative open-ended responses collected via Google Forms, the research investigates students' awareness of institutional policies, their views on academic honesty, and the implications of GAI for their learning practices. The study reveals a significant gap in students' understanding of ethical guidelines, with many uncertain about when and how to disclose their use of GAI tools. It highlights the need for more precise institutional policies and for integrating digital literacy programs that address the benefits and risks of GAI use. Furthermore, the study emphasizes the importance of fostering responsible usage by educators and institutions, promoting balanced engagement with GAI tools to enhance learning without compromising the development of critical thinking, creativity, and independent problem-solving skills. The findings suggest that with proper guidance and policy adaptation, GAI can be a valuable resource in academia while preserving the integrity of the educational process.

KEYWORDS

generative artificial intelligence (GAI), ethical challenges, digital literacy, students' perceptions, engineering students

1 INTRODUCTION

Generative artificial intelligence (GAI) has seen exponential growth in adoption and integration across various fields, including academia, in recent years.

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Technologies such as ChatGPT, DALL-E, and Midjourney have demonstrated unprecedented capabilities in autonomously generating text, images, and other media forms [1]–[3]. Students increasingly employ GAI to assist in various tasks in academic settings, from drafting essays to solving complex mathematical problems. This development has brought new efficiencies to educational processes and sparked debates about the ethical implications and impacts on student learning behaviors [4]. The rise of GAI in academia warrants a closer examination of how students perceive its role and navigate the ethical considerations associated with its use.

The unique capabilities of GAI can redefine the academic landscape by offering immediate assistance, personalized learning, and adaptive content generation [5]. Yet, these advantages present several challenges, particularly regarding academic integrity. For instance, students might leverage GAI not only as an aid but as a primary tool for completing assignments, potentially leading to issues of plagiarism and dependency [6], [7]. GAI raises concerns about the potential decline in independent thinking and problem-solving when students rely on AI-generated outputs without engaging deeply with the learning material [8]–[12].

The ethical implications of using GAI in academia are complex and multifaceted, involving academic integrity, accountability, and fairness [13]–[16]. However, these policies are still developing, and students' awareness and adherence to them vary significantly. It raises questions about the effectiveness of such regulations and the potential need for more explicit guidance and education on ethical GAI use [17], [18]. As GAI tools become more accessible, there is a risk that students may prioritise efficiency over understanding, relying on AI-generated answers rather than personal insight and reflection [19], [20].

Rapid GAI development has outpaced institutional policies, leading to inconsistencies in ethical guidance [21]–[23]. By analyzing students' views, this study will contribute to the development of ethical guidelines that align with educational objectives and the evolving landscape of digital technology [24]. Such insights are crucial for educators and policymakers in crafting balanced approaches that embrace the benefits of GAI while safeguarding academic integrity [25].

The literature suggests that students hold mixed views on the ethicality of GAI usage, with some perceiving it as an acceptable tool for streamlining tasks and others expressing concerns about its potential to facilitate academic misconduct [26]. This divergence reflects broader societal debates on AI ethics, highlighting the need to understand students' perspectives [27] comprehensively. Examining students' attitudes will provide valuable insights into how GAI can be used responsibly within academic contexts [28].

With the rapidly expanding capabilities of GAI, there is a growing need for educational institutions to balance the benefits of AI-facilitated learning with a clear ethical framework [29]. While some academic tasks may benefit from the efficiency and Innovation that GAI tools bring, there is also the potential for misuse if these technologies are not guided by ethical principles that promote academic honesty and genuine learning [30], [31]. For instance, tools that generate essays or solve equations may inadvertently encourage academic dishonesty if students use them without adequate oversight or understanding of ethical boundaries [2]. Given the critical role that academic integrity plays in shaping students' future success, a deeper exploration of these dynamics is crucial to helping institutions develop policies that foster both Innovation and accountability in GAI use [32].

In addition to ethical considerations, GAI's impact on students' long-term academic development is a growing concern [33]. Relying on AI tools for assignment completion may alter students' cognitive development, as critical thinking, problem-solving,

and self-reflection skills could be underutilized [34]. Over time, this dependency may shift the educational process from active learning to passive content consumption, potentially affecting students' ability to engage deeply with course material and adapt to non-AI-assisted tasks in professional environments [35]. Therefore, investigating students' perceptions and ethical awareness of GAI addresses immediate academic concerns and anticipates broader implications for lifelong learning and career readiness, ensuring that GAI supports rather than supplants essential academic and professional skills [36]. Another critical dimension of GAI use in academia is educators' role in shaping ethical standards and usage practices among students [37], [38]. However, research indicates a disparity in educators' preparedness to address the ethical challenges posed by GAI, with some feeling insufficiently equipped to implement AI-specific guidelines or to integrate GAI responsibly within their curriculum [39].

Students with higher levels of digital literacy may approach GAI tools with a better understanding of ethical implications and potential limitations, whereas those with less exposure might lack the knowledge to critically assess the appropriateness of GAI in various academic contexts [40]–[42]. This gap can exacerbate unequal access to learning resources and lead to differing academic performance standards. By examining how students perceive and ethically evaluate GAI, this research seeks to inform future strategies for equitably integrating GAI into education, ensuring that all students, regardless of digital proficiency, can benefit from this technology in ways that uphold academic integrity and foster meaningful learning experiences.

Considering these complexities, this study aims to fill a gap in academic discourse by providing empirical data on student perceptions of GAI usage, including its application in academic tasks, ethical considerations, and awareness of institutional policies. Specifically, it investigates the ethical dimensions of GAI usage among students, focusing on perceptions of academic integrity, the boundaries of acceptable use, and the associated moral concerns. As GAI continues to permeate higher education, understanding its implications for academic conduct and educational values is essential. This study will offer foundational insights that can inform future policies and foster a responsible integration of GAI in academic settings.

2 LITERATURE REVIEW

2.1 GAI in academia: An overview

Generative artificial intelligence has revolutionized various fields, including education, by offering tools that generate content, analyze data, and enhance creativity [13], [24]. The integration of GAI into academia has been driven by tools such as ChatGPT, DALL-E, and Codex, which allow users to generate essays, solve problems, and even create artistic works autonomously [43]. These capabilities position GAI as a transformative learning tool, enabling students to access immediate assistance, particularly in areas where traditional resources are limited. However, its increasing usage has also raised concerns about the ethical implications of GAI applications in academic tasks [13], [17], [34]. Studies highlight the dual nature of GAI in education. On the one hand, it fosters efficiency, Innovation, and access to personalized learning resources. On the other hand, it challenges traditional academic norms by enabling students to bypass critical thinking and problem-solving processes [9], [11], [44]. This dichotomy necessitates exploring how students perceive and ethically approach GAI to inform its responsible integration into academia.

2.2 Ethical implications of GAI in academic settings

Ethical concerns surrounding GAI usage in academia primarily revolve around academic integrity, accountability, and fairness [45]–[48]. Tools such as ChatGPT can easily generate content indistinguishable from human output, creating risks of plagiarism and unauthorized assistance in assignments [23]. Academic institutions are beginning to respond by drafting AI-specific policies to safeguard academic honesty, but these regulations are still nascent and lack widespread adoption [49]. Research by [50] emphasizes the need for ethical frameworks that align GAI usage with educational objectives. Ethical considerations include whether students disclose their use of GAI in assignments, their awareness of institutional policies, and the extent to which GAI undermines or enhances their learning [51]. Furthermore, students' ethical awareness is influenced by educators' level of guidance, who often struggle to keep up with the rapid evolution of AI technologies [52].

2.3 Student perceptions of GAI

Student perceptions of GAI vary and are influenced by factors such as familiarity with technology, digital literacy, and academic pressures [53]. Some students view GAI as a helpful tool for managing their workload, improving efficiency, and gaining insights into challenging subjects [17], [18]. Others express concerns about its potential to compromise their intellectual growth and ethical boundaries. This disparity highlights the importance of understanding student attitudes to effectively develop policies that address their needs and concerns [13], [54]. Moreover, students often approach GAI cautiously, particularly regarding its ethical implications [55]. While many acknowledge its utility, they are also aware of the risks associated with misuse, such as dependency on AI-generated content and potential violations of academic policies. This highlights the need for educational interventions that enhance students' understanding of responsible GAI usage.

2.4 Role of educators and institutions in shaping GAI use

The role of educators in guiding students' ethical use of GAI cannot be overstated. As primary stakeholders in academic integrity, educators must stay informed about GAI's capabilities and limitations to provide appropriate guidance [56]. However, research indicates a significant gap in educators' preparedness to address these challenges. Many educators feel under-equipped to handle the ethical complexities introduced by GAI, underscoring the need for institutional support and professional development [23], [57]. Institutions also play a critical role in fostering ethical use of GAI by implementing clear policies and providing resources for students and faculty. In additional, institutions that actively engage in discussions about GAI, develop comprehensive guidelines, and integrate AI ethics into their curricula are better positioned to mitigate the risks associated with GAI [58]. These efforts can help foster a culture of responsible AI use aligned with academic goals.

2.5 GAI and academic integrity

Academic integrity is one of the most congested areas in discussions about GAI [6], [13]. The ability of these tools to produce high-quality outputs raises questions

about authorship and originality. Recent studies emphasize that students often struggle to navigate the thin line between leveraging GAI for support and committing academic misconduct [10], [41]. This highlights the urgent need for clear definitions and guidelines for acceptable use. Furthermore, the global variation in institutional policies creates inconsistencies in how GAI is perceived and utilized [22], [59]. While some universities embrace GAI as a tool for enhancing learning, others impose strict limitations to preserve traditional academic values. This variability underscores the importance of a unified approach to addressing GAI's impact on academic integrity [56].

2.6 GAI's impact on student learning and development

The effect of GAI on student learning extends beyond ethical concerns [15], [24]. Proponents argue that GAI can democratize access to knowledge by providing personalized assistance and enabling students to tackle complex problems efficiently [2]. However, critics warn that over-reliance on GAI can hinder the development of critical thinking and problem-solving skills, which are central to academic and professional success. Studies suggest that students who use GAI responsibly can benefit significantly, particularly in creative writing, coding, and data analysis [60]. However, when misused, GAI can lead to a passive learning experience, where students become consumers of AI-generated knowledge rather than active participants in their education [61]. This dichotomy underscores the importance of fostering a balanced approach to GAI integration [58].

2.7 Digital literacy and access to GAI

Digital literacy significantly influences how students perceive and use GAI [62], [63]. Students with higher digital literacy are more likely to understand GAI's ethical implications and limitations, enabling them to use it responsibly [64]. Conversely, students with limited exposure to technology may unintentionally misuse GAI, highlighting the need for digital literacy education. Access to GAI also plays a role in shaping its impact on education [65]. While GAI tools are increasingly accessible, disparities in technological resources can create inequalities in how students benefit from these technologies. Addressing these disparities is crucial for ensuring all students have equal opportunities to leverage GAI in their academic pursuits [66].

3 METHODS

3.1 Research design

This study employs a mixed-methods approach [67], combining quantitative and qualitative methods to analyze students' perceptions and ethical considerations in using GAI for academic task completion. A survey-based methodology was chosen as the primary data collection tool to ensure broad participation and comprehensive insights into students' usage patterns, perceptions, and ethical awareness to collect the quantitative aspect. Open-ended questions will be used to collect the qualitative aspect [68].

3.2 Population and sampling

The target population consists of students currently enrolled in one university and one polytechnic. A stratified random sampling technique was employed to ensure representation across academic levels, study programs, and demographic groups. The minimum sample size of 300 students was determined based on Cochran's formula for large populations, which recommends a minimum of 267 respondents for a 95% confidence level and a 5% margin of error. To increase statistical power, compensate for potential invalid responses, and ensure adequate subgroup representation, the target sample was increased to 300. This sample size is aligned with standards for mixed-methods survey studies in higher education research.

3.3 Data collection

A structured questionnaire was developed as the main instrument for data collection, informed by the objectives outlined in the introduction and the literature review [69]. The questionnaire consists of 25 questions divided into three main sections:

a) Usage Patterns. Includes questions about the frequency of GAI use, contexts of use (e.g., academic tasks, research, or presentations), and methods of using GAI (e.g., tutorials, self-exploration).
b) Perceptions and Ethics. Explores students' views on the usefulness, ethical implications, and concerns regarding GAI, including questions about the disclosure of GAI use in academic work and the perception of fairness.
c) Demographics. Collects background information such as age, education level, program of study, and exposure to rules or guidance regarding GAI use.

3.4 Data analysis

In the data analysis process, any data that was considered invalid—such as incomplete, erroneous, or outlier values—was systematically removed to ensure the integrity and reliability of the results. A thorough review of all entries was conducted, applying established criteria for data consistency and completeness to determine invalid data [70]. This involved removing cases where essential information was missing or where responses fell outside predefined logical ranges.

Following this cleaning process, the remaining dataset was evaluated for its representativeness and overall completeness. Based on this analysis, approximately 98% of the original data was retained for final analysis. This proportion reflects the robustness of the dataset after removing unreliable or inconsistent data points, ensuring that the results drawn are both valid and reliable. The collected data will be analyzed using the following methods (see in Table 1):

a) Quantitative analysis: Descriptive statistics will summarize usage patterns, frequency distributions, and demographic characteristics.
b) Qualitative analysis: Open-ended responses will be analyzed thematically using a coding framework to identify recurring themes related to ethical concerns, challenges, and suggestions for improvement.

Table 1. Analysis methods used

Analysis Methods	Questions Concerned	Objectives
Descriptive Statistic	1, 2, 3, 5, 7, 11, 12, 13, 14, 15, 16, 17, 21, 22	Identify respondents' socio-demographic situations and information on tool use (tools used, context of use, usage objectives, usage strategies, perceptions of tools, etc.)
Correlation	3	understand usage objectives
Lexical Analysis	8, 9, 18	Identify themes emerging from open-ended questions
Similarity analysis	6	

3.5 Instrument used

It is essential to define clear research objectives and perform a comprehensive literature review to identify existing validated instruments related to AI usage and ethics in academia [71]. The instrument should encompass a mixed-methods approach, incorporating demographic questions, Likert scale items to evaluate perceptions, and open-ended questions to explore ethical considerations [72]–[75]. Pilot testing with a representative sample of engineering students will refine the instrument's clarity and relevance. Key themes, including GAI applications, academic integrity, ethical boundaries, and awareness of institutional policies, should be thoroughly addressed. Following validation, the finalized instrument must uphold stringent ethical research standards. The complete list of instrument components and response types is presented in Table 2. This section outlines each item included in the questionnaire, grouped according to the construct it measures. An overview of the questionnaire structure and the types of answers required for each item is shown in Table 2.

Table 2. List of instruments used

No	Concern of Questions	Types of Answers
1	Generative AI tools used	Likert scale
2	Context of use	
3	Usage objectives	
4	Precision of use	Open-ended question
5	Usage time	Single-choice question
6	Learning to use GAI tools	Open-ended question
7	Tools perception	Single-choice question
8	Tools perception (Precision)	Open-ended question
9	Fears related to the use of tools	
10	Ideas for tool improvements	
11	Mentions of tools in use	Likert scale
12	Dialogue with tools	
13	Verification of responses given by tools	
14	Using group tools	
15	Information on tools from teachers, trainers, supervisors, or references	
16	Encouraging the use of tools	

(Continued)

Table 2. List of instruments used *(Continued)*

No	Concern of Questions	Types of Answers
17	Understanding the rules	Single-choice question
18	Knowledge of rules (precision)	Open-ended question
19	Level of education	Single-choice question
20	Level of education (precision)	Open-ended question
21	Affiliation	Single-choice question
22	Age category	
23	Information about the questionnaire	Open-ended question
24	Comments on the questionnaire	

The complete set of questionnaire items used in this study has been provided in Appendix, along with the theoretical and empirical literature sources from which each item was adapted. Including the full instrument enhances transparency and demonstrates the reliability and validity of the measures. Each construct was operationalized based on well-established scales, and the adaptation process followed standard instrument development procedures to ensure conceptual alignment and measurement accuracy.

3.6 Ethical considerations

The study adheres to ethical research practices [76], [77]. Participants are informed about the purpose of the research, their rights, and data confidentiality through an informed consent form provided at the beginning of the survey. Participation is entirely voluntary, and respondents can withdraw at any time. No personally identifiable information is collected to ensure anonymity.

3.7 Tools and software

Data will be collected through an online survey platform used Google Forms to maximize accessibility and participation. Quantitative data analysis is done by using R Studio, while qualitative analysis is done by using NVivo.

3.8 Limitations

While the survey-based method ensures broad participation, it is subject to self-reporting bias, where participants may overstate or understate their ethical considerations. Additionally, the study focuses on student perspectives, which may not fully capture the institutional or educator viewpoints on GAI usage.

4 RESULT

4.1 Description statistic

Descriptive statistics will be employed in this study to summarize and describe the characteristics of the data collected from engineering students regarding their

perceptions and ethical considerations of GAI for academic task completion [78]. Specifically, descriptive statistics will help in understanding the distribution of responses concerning key variables, such as the level of familiarity with GAI, perceived benefits and risks, and ethical concerns related to academic integrity [79]. These statistical summaries will provide a foundational understanding of the data, facilitating further inferential analyses and interpretation of the study's findings.

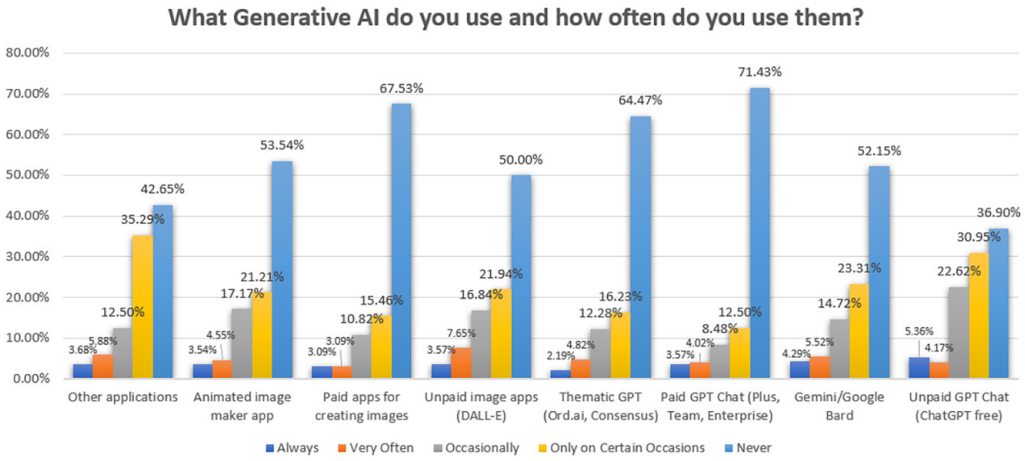

Fig. 1. The use of GAI by students

Figure 1 shows the frequency with which students use various GAI applications. Free tools—especially Unpaid GPT Chat (ChatGPT Free)—are the most widely used, with the highest combined usage across categories (the largest being Only on Certain Occasions = 30.95% and Occasionally = 22.62%). Gemini/Google Bard follows with substantial usage (Occasionally = 14.72% and Only on Certain Occasions = 23.31%). In contrast, paid services such as Paid GPT Chat (Plus/Team/Enterprise) show the highest proportion of non-users (Never = 71.43%) and are therefore the least utilized. Overall, the figure indicates that accessibility strongly shapes usage patterns, with free applications being used far more frequently than paid ones.

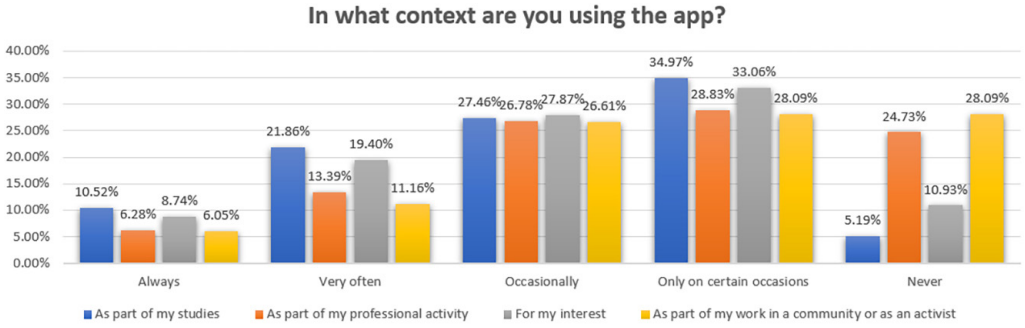

Fig. 2. The context for the use of GAI by students

Figure 2 shows the contexts in which students use GAI applications. The highest level of use occurs in academic settings, with 34.97% of respondents reporting that they use GAI only on certain occasions and 27.46% using it occasionally. Outside academic tasks, students also frequently use GAI for personal interest (33.06% only on certain occasions; 27.87% occasionally), while professional use remains moderate (28.83% only on certain occasions; 26.78% occasionally). The lowest engagement

appears in community or activist work, where 28.09% use GAI only on certain occasions and 26.61% occasionally, and where routine use (always or very often) is minimal across all categories. Overall, the figure shows that GAI is used most prominently for study-related activities, followed by personal interest, with substantially lower usage in professional or community contexts.

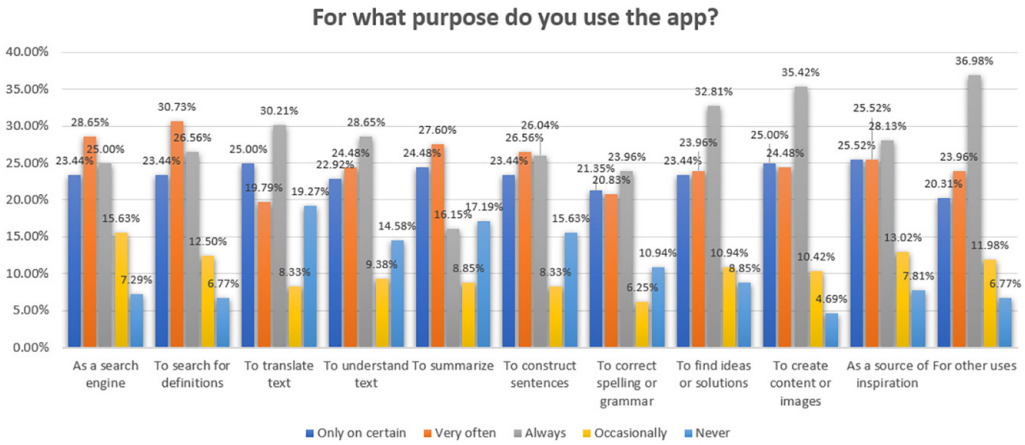

Fig. 3. The purpose of using the application

Figure 3 presents the purposes for which students use GAI applications. The most common uses include generating content or images (35.42% always) and supporting other unspecified tasks (36.98% always), followed by finding ideas or solutions (32.81% always). Students also frequently rely on GAI to understand text (28.65% only on certain occasions) and to summarize information (27.60% often). In contrast, tasks such as translating text and correcting spelling or grammar show higher rates of occasional or selective use rather than consistent engagement. Overall, the figure shows that students primarily use GAI for creative production, idea generation, and task-specific academic support, with more routine language-related tasks being used less intensively.

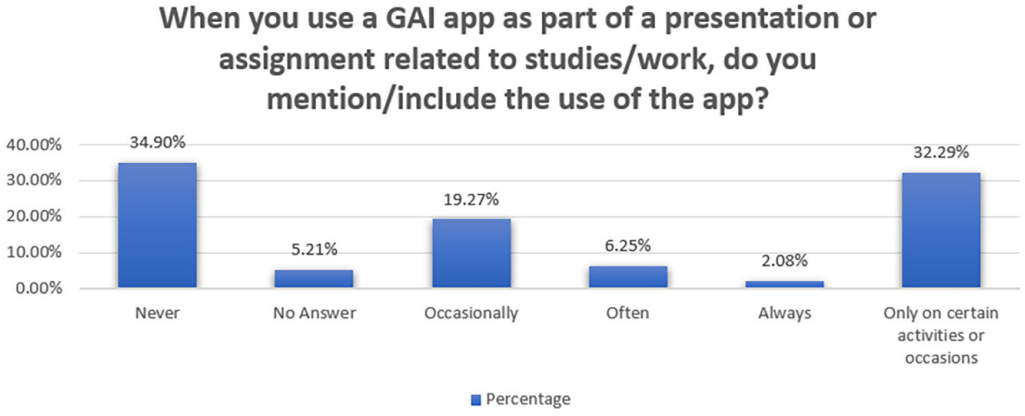

Fig. 4. Acknowledging the use of GAI for preparing the presentations, assignments, or for work by the user

Figure 4 shows that most students do not disclose their use of GAI in presentations or assignments, with the highest proportion selecting "Never" (34.90%). This is followed closely by those who disclose it only in specific situations (32.29%), indicating that transparency about GAI use is generally low and largely context-dependent.

Fig. 5. The visualization of user engagement in dialogues with GIA

Figure 5 shows that most students actively refine the answers they receive from GAI applications, with the highest proportions selecting "Often" (25.00%) and "Occasionally" (24.48%). This indicates that iterative interaction with the app is common, while only a small proportion (11.46%) report never refining the responses.

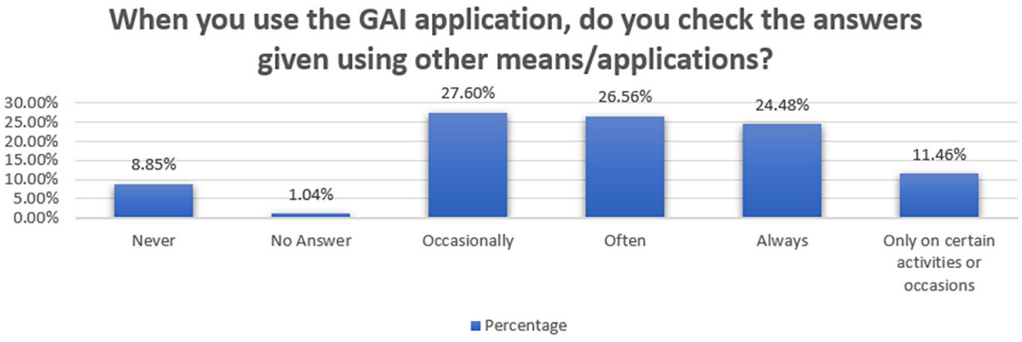

Fig. 6. The visualization of user verifying the answers by GIA

Figure 6 shows that most students verify the answers generated by GAI applications, with the highest proportions selecting "Occasionally" (27.60%) and "Often" (26.56%). A substantial proportion also reports "Always" checking the results (24.48%), indicating a generally cautious approach. Overall, the data suggests that users generally adopt a careful approach to validating GAI outputs, though verification practices vary depending on context and perceived reliability.

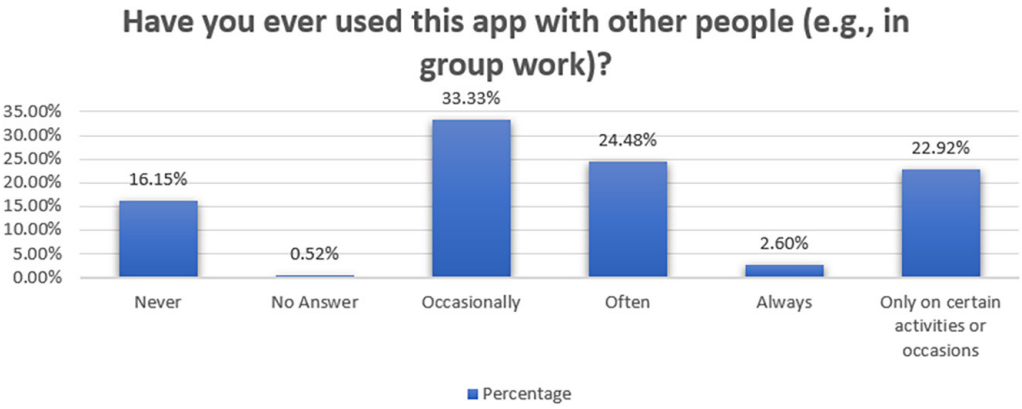

Fig. 7. The visualization of user collaboration using GIA

Figure 7 shows that most students have used GAI applications collaboratively, with "Occasionally" being the most common response (33.33%), followed by "Often" (24.48%) and "Only on certain activities or occasions" (22.92%). Overall, GAI-supported collaboration appears selective and task-dependent rather than widespread.

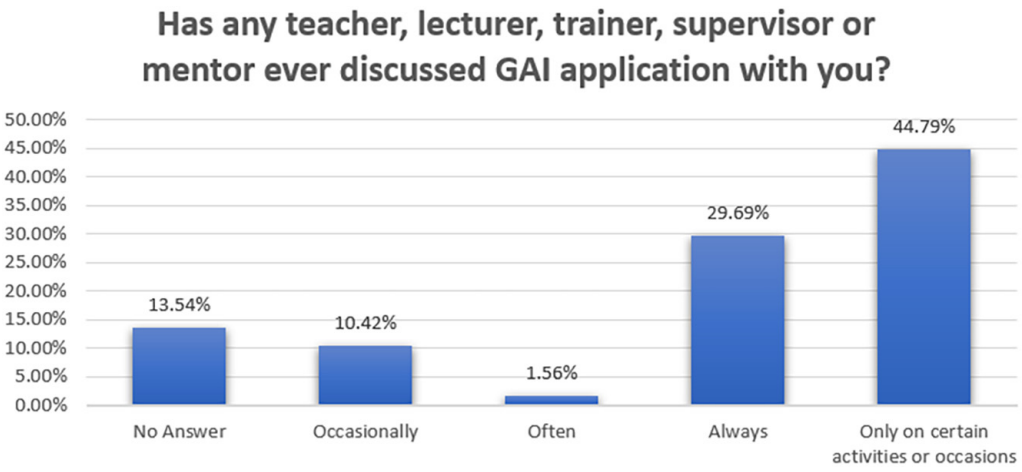

Fig. 8. The number of educators who discussed about GAI applications with their students

Figure 8 shows that discussions about GAI applications with teachers, lecturers, supervisors, or mentors occur most commonly only on specific occasions, as indicated by the highest percentage (44.79%). A considerable proportion also reports that such discussions always take place (29.69%). Additionally, 26 respondents (13.54%) provided no answer. Overall, educator engagement with GAI is present but varies widely, with most discussions occurring in specific task-related contexts.

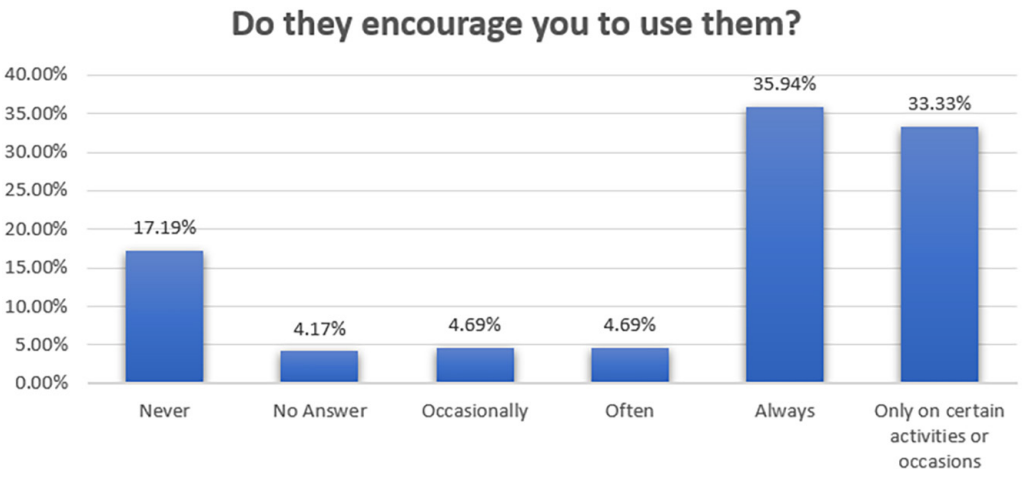

Fig. 9. The number of educators who encouraged students to use GAI

Figure 9 shows that most students experience encouragement from teachers, lecturers, or mentors to use GAI applications, with the highest proportion selecting "Always" (35.94%), followed by "Only on certain activities or occasions" (33.33%). Overall, the data suggests that although encouragement to use GAI is generally present, the level of support varies widely depending on educators' familiarity and attitudes toward generative artificial intelligence.

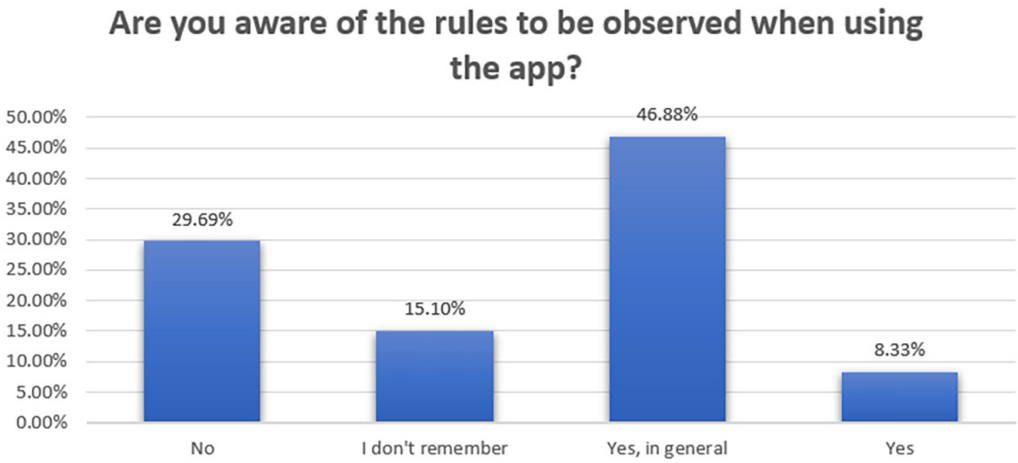

Fig. 10. The visualization of user awareness about the GAI rules

Figure 10 shows that most students have only a general awareness of the rules for using GAI applications, with 46.88% selecting "Yes, in general." Meanwhile, a considerable proportion (29.69%) report having no awareness at all. Only 8.33% indicate full awareness ("Yes"), while 15.10% state that they do not remember the rules. These findings indicate that while some familiarity exists, detailed knowledge of GAI-related guidelines remains limited, highlighting the need for clearer communication and stronger institutional guidance to support responsible use.

4.2 Heatmap Analysis

The correlation analysis of the survey data shows how strong the relationship is between one goal of using GAI applications and another goal (refer to Table 3). The results of this correlation can help identify more detailed usage patterns and recognize the main interrelated functions in using these apps. It provides a clearer understanding of the interrelationships between different application purposes and identifies common patterns of usage based on specific functions.

Table 3. The type of relationship in the heatmap analysis

Type of Relationship	Description
Strong Relationship	• The use of "Creating summaries" has a high correlation with "Understanding text" (0.677) and "Constructing sentences" (0.766). • It is used as a "Search engine" and is highly correlated with "Searching for definitions" (0.684).
Moderate Relationship	Use for "Translating text" is correlated with "Understanding text" (0.646), indicating that respondents who frequently use the app to translate tend to also use it to understand the context of the text.
Weak Relationship	The use of "Create content or images" does not show a strong correlation with most of the other variables, except for "Understand text" (0.485).

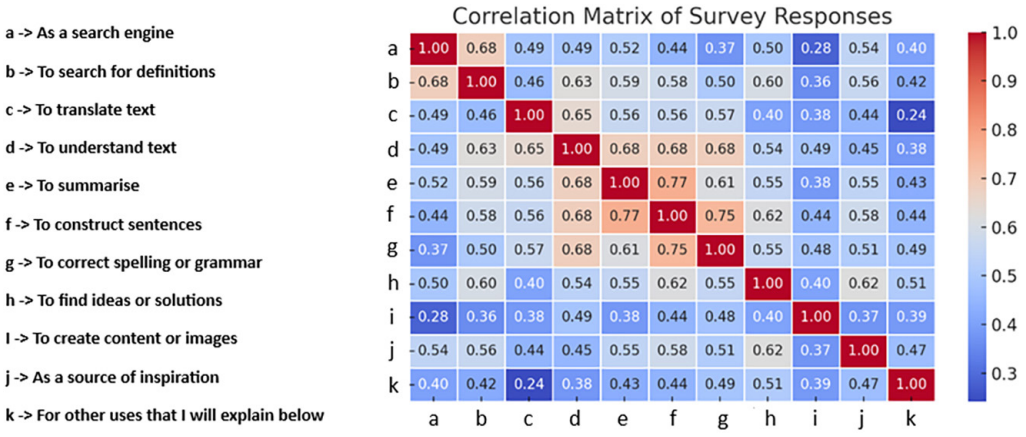

Fig. 11. Heatmap analysis result

The visualization in Figure 11 shows a heatmap of the correlation matrix, displaying the relationships between different usage purposes of GAI applications based on the survey. Table 4 shows the color used to interpret the visualization. Darker colors (red) indicate a stronger positive correlation, while lighter colors (blue) indicate weaker or negative correlations. Here is the correlation matrix visualization for the survey data on GAI usage. Although our dataset did not contain negative correlations, the full –1 to +1 scale is now displayed to maintain methodological consistency with Pearson correlation standards and to avoid any misinterpretation regarding the range of possible values. The heatmap shows the strength of relationships between different uses of the application. Darker colors indicate stronger correlations, while lighter colors suggest weaker or no correlations.

Table 4. The relation between colors and interpretation of the visualization

Correlation	Interpretation of the Visualization
High Correlation (Dark Red)	• There is a strong correlation between "Creating summaries" and "Arranging sentences" (0.77), as well as between "Creating summaries" and "Understanding text" (0.68). • This indicates that respondents who frequently use the application to create summaries tend to use it to understand text or arrange sentences.
Moderate Correlation (Medium Colours)	The relationship between "Using it as a search engine" and "Searching for definitions" (0.68) and between "Using it as a search engine" and "Using it as a source of inspiration" (0.54) suggests that the application is often utilized for information seeking and generating inspiration.
Low Correlation (Light Blue)	Lower correlations can be observed for the "Creating content or images" variable with most other variables, indicating that this usage is less frequently linked to other text-related purposes.

Table 5 shows the interpretation of the correlation analysis results of the survey data on the use of GAI applications.

Table 5. The relationship between the variables

Relationship	Description
Relationship between Use for Understanding Text, Summarizing, and Sentence Building	• The high correlation between the variables "To summarise" and "To comprehend text" (0.677) as well as "To summarise" and "To construct sentences" (0.766) indicates that when one uses the app to comprehend text, they tend to use the same app to summarise. • This indicates that GAI apps tend to be comprehensively utilised to understand deeper information. • It also means that users tend to perform a sequential analytical process, such as understanding the text first, then summarising, and finally constructing new sentences based on that understanding.

(Continued)

Table 5. The relationship between the variables *(Continued)*

Relationship	Description
Use as a Search Engine and to Search for Definitions	• The correlation between "As a search engine" and "To look up definitions" (0.684) shows that many respondents use AI apps as an alternative to search engines to get definitions of certain words or phrases. • This suggests that users see AI apps as multifunctional tools, not only for general information searches but also as dictionaries to look up word meanings.
Correlation between Use for Correction and Text Comprehension	• The correlation between "To correct spelling or grammar" and "To understand text" (0.683) shows that respondents frequently use the app to ensure comprehension and correct grammar. • This could mean that users use the app to correct the text they understand or create based on that understanding.
Use as a Source of Inspiration	• The correlation between "As a search engine" and "As a source of inspiration" (0.544), as well as with the variable "To search for definitions" (0.562), shows that users who use the app to search for information or definitions also tend to use it to get inspiration. • This demonstrates the role of AI apps as a tool for idea exploration and creative thinking.
Weak Relationship with "To create content or images."	• The low correlation of "To create content or images" with other variables suggests that visual or creative content use is still limited and unrelated to text comprehension or summarization. • This indicates that respondents may use AI applications more for textual purposes than visual content or images.

The correlation results show that users tend to utilise AI applications in a continuous series of activities, for example, comprehending text → summarizing → sentence construction → correcting grammar. There is a distinct usage trend between the purpose of use for textual activities (comprehension, summarisation, correction) and creative purposes (content or image creation), with textual use showing a stronger relationship. This interpretation shows a specific usage pattern and indicates that AI applications are used more for text-related functions, such as comprehension and summarisation, than for creative or visual functions.

4.3 Thematic analysis

Thematic analysis is a method for analyzing qualitative data by identifying patterns or emerging themes [80]. This approach is effective for exploring the relationships between patterns within a specific phenomenon and explaining it from the researcher's perspective [81, 82]. As a foundational method in qualitative research, thematic analysis helps researchers deeply understand data and is considered a core skill for qualitative analysis [83]. Identifying themes, which is its hallmark, is also an essential skill in many qualitative analysis methods [84, 85]. Based on the distributed instruments, items 8, 9, 18, and 6 focus on perceptions of tool precision, fears of tool usage, knowledge of rules for accurate application, and the learning process for using GAI tools. These aspects provide insights into user readiness and interactions with tools in various contexts.

Table 6. The transcription and code list according to thematic analysis

Transcription	Code
• Make work easier • Make it easy • Speeds up work • Quite easy to use • Simple, fast • Time efficiency • Short and fast • Easy to understand • Make life easier	Theme 1: Convenience and Efficiency

(Continued)

Table 6. The transcription and code list according to thematic analysis *(Continued)*

Transcription	Code
• Getting references • Helps occasionally • Facilitates knowledge • Provides inspiration • Find information quickly • Helps in a fleeting time • Extremely helpful in this era of technology • Helpful for activities	Theme 2: Positive Potential
• Do not rely on GAI • Good but dangerous • Make humans stupid • Dependence on GAI	Theme 3: Risk and Dependability
• Less effective • Unknown source • Not necessarily accurate • Information is not always precise • Requires verification of information	Theme 4: Accuracy and Validation
• Depend on the use • Situational • According to the user's purpose • Needs-dependent • Positive or negative depending on the user	Theme 5: Flexible Perspective
• Sophisticated, creative, practical • Powerful • Innovative and futuristic • Recent technology • Search engine	Theme 6: Technology and Innovation

Table 7. The results for each theme and the frequency of appearances

Code	Frequency of Appearance
Theme 1: Convenience and Efficiency	9
Theme 2: Positive Potential	8
Theme 3: Risk and Dependability	5
Theme 4: Accuracy and Validation	5
Theme 5: Flexible Perspective	5
Theme 6: Technology and Innovation	5

The thematic analysis results in Table 6 show that GAI is widely perceived as a tool capable of increasing efficiency and simplifying tasks, making it an asset in academic and professional activities. Users appreciate its ability to provide quick solutions, references, and inspiration that help them make sense of complex information and improve productivity. However, concerns about over-reliance on GAI may weaken critical thinking and independent problem-solving skills. In addition, there is skepticism about the accuracy of the information provided, so users are reminded to always validate data, especially in contexts that require high precision. While the technology is appreciated for its Innovation and practicality, its impact is highly dependent on how it is used. Users agreed that the benefits of GAI will be maximized if it is used as a supporting tool rather than a primary solution, emphasizing the importance of balanced and judicious use to ensure a positive impact (see in Table 7).

5 DISCUSSION

5.1 Balancing the advantages and challenges of GAI in academia

Generative artificial intelligence tools such as ChatGPT and DALL-E transform academia by enabling personalized learning, efficient content creation, and problem-solving [86]. These tools democratize access to information, offering students opportunities to enhance productivity and tackle complex tasks more confidently. However, their rapid adoption presents challenges, including risks to academic integrity, over-reliance, and diminished active learning. GAI's potential to blur authorship boundaries complicates the evaluation of originality, pressing institutions to establish clear standards for acceptable use to uphold academic integrity [87].

Dependency on GAI poses another critical concern, as excessive reliance on these tools can undermine the development of essential skills like critical thinking, creativity, and problem-solving [88]. Students using GAI to bypass active engagement with materials may experience reduced intellectual growth and fail to build resilience through iterative learning [89]. These risks are especially pronounced in fields requiring nuanced argumentation and deep analytical skills [90]. Institutions must, therefore, emphasize GAI as a supplement to human cognition rather than a substitute.

The integration of GAI also raises equity issues, as disparities in access to AI tools can exacerbate existing educational inequalities [91]. Ensuring equitable access through comprehensive training and financial support is essential to prevent widening the gap between resource-rich and under-resourced students. Additionally, ethical concerns regarding biases embedded in AI algorithms necessitate vigilant oversight by educators and policymakers to promote fair and inclusive practices [92], [93].

Academia must adopt a balanced approach to harness GAI's potential while mitigating its challenges [94]. It includes embedding AI ethics into curricula, fostering digital literacy, and training educators to guide students responsibly. Collaborative efforts with AI developers can ensure tools align with ethical and pedagogical priorities. By proactively addressing these dimensions, GAI can be integrated to enhance educational outcomes while preserving the core values of academic integrity and critical engagement.

5.2 Inconsistent ethical awareness and policy gaps

The study highlights a critical issue of variability in students' understanding of ethical boundaries when using GAI in academia. While students broadly grasp general moral principles, they lack precise knowledge of institutional guidelines governing GAI [95]. This gap leaves many in a grey area, making decisions based on personal judgment rather than established standards. Such inconsistencies pose risks to academic integrity, as some students unknowingly misuse GAI while others, uncertain about its acceptability, hesitate to leverage its potential benefits.

Compounding this problem is the lack of standardized GAI policies across institutions. Universities and faculties often adopt differing stances on acceptable GAI use, resulting in a fragmented approach that confuses students, especially those in interdisciplinary or international settings [53], [96], [97]. Moreover, where policies exist, they are frequently under-communicated or outdated, failing to keep pace

with the rapid evolution of GAI technologies. Without clear, actionable, and regularly updated guidelines, students remain uncertain about navigating GAI ethically and effectively.

Addressing these challenges requires institutions to prioritize explicit, accessible, and context-specific policies on GAI usage [98]. These should include clear examples of acceptable practices, such as when and how to disclose GAI assistance in assignments. Proactive communication strategies, such as workshops and curriculum-integrated discussions on AI ethics, are essential to foster widespread understanding [99]. Equipping educators with training to guide students on GAI use is equally important, as inconsistent educator readiness exacerbates ethical application and enforcement gaps [100], [101].

Furthermore, institutions must collaborate globally to develop flexible frameworks that accommodate cultural, technological, and educational differences while anticipating future GAI advancements [102]. These frameworks should include mechanisms for regular review to maintain relevance in a rapidly evolving landscape. By fostering transparency, standardization, and proactive engagement, academic institutions can bridge the gaps in ethical awareness, empowering students to use GAI responsibly as a tool for Innovation and educational growth.

5.3 Academic integrity and disclosure practices

The study highlights a critical trend that students often fail to disclose their use of GAI tools in academic work, reflecting concerns about its acceptability and the lack of clear institutional guidance [103]. This selective disclosure underscores the tension between GAI's growing legitimacy as an educational resource and the ambiguity surrounding its role in maintaining academic integrity [104]. Without consistent standards, students navigate a grey area, risking misaligned expectations and fostering inconsistent practices in their educational endeavors.

A key factor driving nondisclosure is the assumption that using GAI for grammar correction or summarization is implicitly acceptable. However, this perception may not align with institutional policies, which often lack clarity or remain under communicated. Furthermore, fear of negative consequences, such as misconduct accusations or reduced grades, reinforces students' reluctance to disclose GAI usage. This hesitation is exacerbated in environments where policy enforcement is inconsistent or vague.

Addressing these issues requires institutions to establish precise, consistent, transparent GAI usage and disclosure guidelines. Policies should define specific contexts requiring disclosure and provide examples of acceptable practices. Institutions can promote trust and accountability by framing transparency as an opportunity to normalize responsible GAI integration rather than as punitive. Educators, too, play a pivotal role by modelling transparency and incorporating GAI ethics into their teaching practices, helping students understand the importance of aligning disclosure with academic integrity.

Finally, institutions must consider academic environments' global and interdisciplinary nature, where divergent expectations complicate GAI's integration. Harmonizing ethical standards across regions and disciplines through collaborative frameworks can foster consistency and reduce confusion. By embracing student-centred policies and encouraging open dialogue, academia can ensure GAI tools are leveraged ethically and responsibly, aligning technological Innovation with the values of higher education.

5.4 The educator's role in ethical AI adoption

Educators are at the forefront of fostering ethical integration of GAI in academia, serving as mentors and student role models [104], [105]. While some educators proactively incorporate GAI into teaching, promoting its potential to enhance creativity, problem-solving, and knowledge generation, others face challenges due to limited familiarity, insufficient institutional support, and the rapid pace of technological evolution. These disparities in readiness highlight the need for systemic interventions to ensure all educators can guide students effectively in navigating GAI's ethical and practical complexities [94].

Professional development programs focused on GAI technologies should be a strategic priority for academic institutions [106]. Such training should cover GAI's capabilities, limitations, and ethical implications alongside practical strategies for integrating these tools into curricula. Educators also need institutional resources, such as AI ethics guidelines and access to AI tools, to develop nuanced understandings of GAI. Collaborative opportunities like workshops and peer mentoring can further equip educators to address emerging challenges in GAI integration, ensuring consistency and depth in their approach [107].

Transparency and modelling responsible GAI usage are essential for educators [33]. By openly sharing their experiences with GAI in lesson planning and assessments, educators can normalize its use while emphasizing the importance of ethical considerations, such as citing AI contributions and verifying outputs. Additionally, embedding AI ethics into curricula through critical discussions of its societal, economic, and cultural implications can help students become informed, responsible users of GAI, enhancing their digital literacy and preparedness for ethical dilemmas in broader contexts. Educators must create inclusive learning environments and advocate for equitable AI resources to bridge disparities in digital literacy and access among students [108]. Tailored support for students with limited exposure to AI technologies ensures all learners can benefit from GAI responsibly [109]. With comprehensive institutional backing, educators can guide students to harness GAI as a transformative tool for Innovation and intellectual growth, safeguarding academic integrity and ethical standards [110].

5.5 The influence of digital literacy on GAI usage

The study underscores the pivotal role of digital literacy in determining how students perceive and utilize GAI tools within academic contexts. Digital literacy, encompassing technical proficiency and ethical awareness, is critical for fostering responsible GAI usage. Students with advanced digital literacy often view GAI as a supplementary resource, using it to enhance their learning by critically evaluating outputs, refining iterations, and engaging in creative ideation. This responsible engagement aligns with GAI's intended purpose as a tool to complement intellectual efforts rather than replace them.

Conversely, students with limited digital literacy face challenges in navigating GAI tools ethically and effectively. These students may misuse GAI unintentionally, relying on it for uncritical content generation or failing to disclose its use in assignments. Such practices risk academic misconduct and missed opportunities to engage with deeper learning processes. The disparity in digital literacy levels often correlates with socioeconomic and technological divides, where students from

under-resourced environments struggle to access or utilize advanced digital tools effectively, widening the academic achievement gap.

Integrating digital literacy education into academic curricula is essential to address these disparities. Students must be taught the technical aspects of GAI tools, such as their strengths, limitations, and biases, alongside ethical considerations like disclosure and plagiarism. Practical workshops and controlled experiences can provide students with hands-on opportunities to use GAI tools while reflecting on their moral implications [111]. Embedding AI ethics into classroom discussions ensures students develop critical evaluation skills and internalize principles of accountability and transparency.

Institutions and educators are collectively responsible for closing the digital divide and fostering inclusive learning environments [112]. Providing equitable access to GAI tools through initiatives like subsidized access or scholarships is fundamental. Simultaneously, professional development for educators in digital pedagogy ensures they are equipped to support students at varying proficiency levels. By prioritizing digital literacy and creating frameworks for ethical GAI use, institutions can prepare all students to critically and effectively engage with these transformative technologies, maximizing their potential for academic and personal growth [113].

5.6 Dependency vs. complementarity in learning

The study underscores a significant concern regarding students' potential over-reliance on GAI tools, which may diminish their engagement in active learning. While GAI offers clear benefits, such as simplifying tasks and improving efficiency, excessive dependence undermines critical thinking, problem-solving, and self-reflection—skills essential for academic success and lifelong learning. Using GAI as a substitute for intellectual effort, students may forgo the deeper cognitive processes involved in analyzing information, constructing arguments, and engaging creatively with material [114].

This dependency is particularly troubling in disciplines requiring analytical and creative thought, such as literature, philosophy, and science, where intellectual contributions are paramount. Reliance on AI-generated outputs in these fields can hinder students from developing core skills crucial for academic excellence and professional readiness. However, when integrated thoughtfully, GAI can enhance learning by supporting higher-order cognitive tasks like brainstorming, organizing ideas, and refining language, allowing students to focus on deeper intellectual engagement. Institutions must establish educational frameworks that emphasize the complementary role of GAI to mitigate dependency. Assignments should encourage students to document their use of GAI and reflect on how it contributed to their understanding. It ensures that AI tools are used to explore rather than shortcuts to task completion. Educators play a pivotal role by modelling responsible use, fostering discussions on the strengths and limitations of GAI, and designing assessments that reward originality and critical analysis. Such approaches ensure that students remain active participants in their learning journey.

Addressing the risks of GAI dependency requires cultivating intellectual curiosity and resilience. By instilling an intrinsic motivation to engage deeply with studies, educators can help students use GAI as a tool for support rather than a replacement for cognitive effort. Institutions must prepare students for real-world challenges, equipping them with the skills to navigate complex professional environments where Innovation and independent thinking are indispensable. Through these

measures, GAI can become a valuable resource that complements active learning and fosters intellectual growth.

5.7 Iterative engagement with GAI tools

The study emphasizes the educational potential of GAI tools, mainly through iterative engagement, where students refine and tailor responses to suit their academic needs [17]. Like a conversational partnership, this process allows students to gain deeper insights into complex topics, encouraging problem-solving and creative exploration. By prompting GAI for alternative perspectives or additional examples, students mirror the Socratic method of inquiry, fostering curiosity and clarity in their academic pursuits [115].

However, reliance on iterative GAI interactions carries significant risks, particularly in diminishing students' active participation in learning. Some students may treat GAI outputs as definitive solutions, bypassing the intellectual effort required for critical analysis, synthesis, and evaluation. This over-reliance may hinder the development of essential skills and result in passive learning, where knowledge is consumed rather than internalized or creatively applied. Such practices threaten the foundation of intellectual growth, especially if left unchecked.

Educators ensure that iterative engagement with GAI supports, rather than replaces, active learning [23], [32], [106]. Educators can foster a culture of thoughtful engagement by encouraging students to analyze and build upon AI-generated outputs critically. Assignments and assessments should emphasize the importance of process and critical evaluation, requiring students to document their interactions with GAI and reflect on the outcomes. This approach develops digital literacy and teaches students to approach GAI as a resource for exploration and refinement, not as an ultimate authority.

Transparency in GAI usage is vital for fostering accountability and ethical engagement [113], [114]. Institutions should integrate policies requiring disclosure of iterative interactions with GAI, ensuring alignment with academic standards. Furthermore, educators must guide students in recognizing biases and inaccuracies in AI-generated responses, teaching them to verify and validate outputs critically. When used responsibly, iterative engagement with GAI can enhance creativity and Innovation, transforming these tools into catalysts for intellectual growth and exploration while safeguarding active participation in learning processes.

5.8 Long-term implications for cognitive development

The widespread adoption of GAI tools, while offering significant efficiencies in text-based tasks like summarization and sentence construction, presents risks to students' cognitive development. Reliance on GAI tools may inadvertently hinder critical skills such as analytical thinking, problem-solving, and creativity, which are essential for academic and professional success [116]. By simplifying complex tasks, GAI enables students to bypass deeper engagement with learning material, potentially undermining their ability to process, synthesize, and interpret nuanced information independently.

This over-reliance risks shifting the focus of education from active learning to passive consumption, prioritizing efficiency over understanding. Active learning fosters critical engagement and cognitive growth, but GAI's automation of intellectual

processes can lead students to engage superficially with course material. It undermines the foundational goal of education to cultivate independent thinkers equipped to adapt to complex challenges in academic and professional contexts. The impact is especially concerning in professional environments where Innovation, strategic decision-making, and ethical judgment are critical.

To mitigate these risks, institutions must integrate GAI thoughtfully into educational practices. GAI should be framed as a tool to supplement intellectual efforts rather than replace them. Assignments should require students to critically evaluate and refine GAI outputs, promoting active engagement and deeper understanding. Moreover, curricula must prioritize skill-building activities, such as comparing AI-generated outputs with personal interpretations, to encourage analysis, reflection, and creativity. This approach reinforces critical thinking while leveraging GAI's benefits.

Finally, embedding digital literacy and ethical AI use into educational systems is essential. Students should be equipped with the skills to critically assess GAI limitations, such as biases or inaccuracies, fostering a mindset of inquiry and skepticism. Educators play a vital role in modelling responsible use and integrating GAI into workflows without diminishing intellectual growth. Institutions should also conduct longitudinal research to study GAI's effects on cognitive development, guiding strategies to ensure GAI complements rather than detracts from education, preparing students for an AI-integrated professional world.

5.9 Bridging institutional and global ethical standards

Adopting GAI tools in academia faces significant challenges due to inconsistent ethical guidelines across institutions and regions [3], [13], [91]. This lack of uniformity creates a fragmented environment where students and educators must navigate conflicting norms, complicating efforts to use GAI responsibly. Some institutions embrace GAI to foster Innovation, while others impose strict limitations to preserve traditional academic values, leaving students and educators uncertain about acceptable practices. Such inconsistencies undermine the educational and ethical potential of GAI. As the global nature of academia grows, these disparities become more pronounced, especially in cross-border education and international collaborations. A practice accepted in one institution may be deemed unethical in another, exposing students to unintended violations of local norms. This misalignment hampers collaborative projects and complicates the establishment of shared ethical standards. Addressing these challenges requires a global framework that ensures clarity, fairness, and adaptability to diverse academic and cultural contexts.

The proposed framework must prioritize innovation and ethical integrity while adapting to regional differences in educational priorities and cultural norms. It must also address technological inequities, ensuring that under-resourced institutions can access GAI tools and the infrastructure to support their use. Partnerships with AI developers and industry are crucial to developing tools with built-in ethical safeguards, fostering transparency, and promoting responsible usage. To achieve this, academic institutions, international bodies, and policymakers must collaborate to develop multi-tiered guidelines that align global principles with local needs. Regular dialogue through international conferences and educational organizations can facilitate knowledge sharing and the harmonization of standards. By addressing these challenges collectively, the academic community can ensure that GAI is a

transformative tool that enhances education while safeguarding ethical principles, fostering equity, and creating a more unified global educational environment.

5.10 Future directions and institutional recommendations

Integrating GAI into academia presents transformative opportunities alongside complex challenges [117]. It is critical to understand its long-term effects on students' cognitive development, academic integrity, and learning outcomes. Research must focus on the longitudinal impact of GAI on learning, particularly its influence on critical skills like problem-solving, creativity, and analytical thinking. Identifying thresholds where GAI use hinders intellectual independence can guide policies and practices that balance Innovation with preserving core educational values.

Ethical considerations are central to GAI integration. Future research should investigate how students perceive and navigate ethical dilemmas related to GAI, identifying factors that shape behavior and uncovering gaps in institutional policies. Evidence-based findings can inform the creation of practical guidelines aligned with academic values. Institutions must also proactively address these challenges by embedding digital literacy and ethical AI usage into curricula. Comprehensive training programs for students and educators should emphasize responsible use, transparency, and critical evaluation of GAI outputs.

Equitable access to GAI technologies is another critical concern. Disparities in digital infrastructure and resources can exacerbate educational inequalities, disadvantaging under-resourced students. Institutional frameworks must prioritize equitable access by providing subsidized tools and robust infrastructure. These frameworks should also evolve to include adaptable guidelines and mechanisms for monitoring adherence as technology advances. Collaborative efforts among academia, policymakers, and AI developers are essential to ensure GAI tools are tailored to educational needs and include ethical safeguards.

Finally, fostering a culture of collaboration and Innovation is key to successfully integrating GAI into academia. Interdisciplinary dialogues, focus groups, and partnerships with technology developers can refine best practices, enhance policy effectiveness, and align GAI advancements with academic goals. By investing in ongoing research, targeted educational programs, and equitable resource distribution, institutions can ensure that GAI enriches learning experiences, safeguards academic integrity, and prepares students for the demands of a technology-driven future.

6 CONCLUSION

The integration of GAI into academic settings has profound implications for both the educational process and the ethical frameworks that guide academic integrity. This study explored how engineering students perceive and navigate the use of GAI in completing academic tasks, revealing both the potential benefits and the significant challenges it poses. The findings highlight the transformative power of GAI tools, which enable students to enhance productivity, foster creativity, and streamline academic tasks such as writing and problem-solving. However, the rapid adoption of these technologies also introduces ethical dilemmas, primarily around issues of authorship, transparency, and academic honesty.

A major concern identified in this research is the inconsistency in students' understanding of ethical guidelines regarding GAI use. Many students are unclear about

when and how they should disclose their use of GAI tools, leading to the potential for unintentional plagiarism and academic misconduct. This ambiguity reflects a gap in institutional policies and the need for clear, context-specific guidelines that can help students navigate these ethical challenges. Furthermore, the study underscores the importance of integrating digital literacy programs and workshops that educate students and educators on the responsible and ethical use of GAI.

Additionally, while GAI can complement academic learning by facilitating tasks like brainstorming or grammar checking, there is a risk that over-reliance on these tools may hinder the development of essential cognitive skills such as critical thinking, problem-solving, and independent learning. Therefore, educational institutions must strike a balance between embracing the advantages of GAI and preserving the integrity of intellectual development. By fostering a culture of transparency, ethical responsibility, and critical engagement, GAI can serve as a valuable tool in academia without undermining the core values of education.

In conclusion, the widespread adoption of GAI in academia presents both challenges and opportunities. Institutions must adapt by developing clear policies, investing in digital literacy, and fostering an environment where GAI tools are used responsibly to enhance learning while safeguarding academic integrity. By proactively addressing the ethical concerns associated with GAI, academia can ensure that these tools contribute positively to the educational experience, helping students develop the skills they need to succeed in an increasingly digital world.

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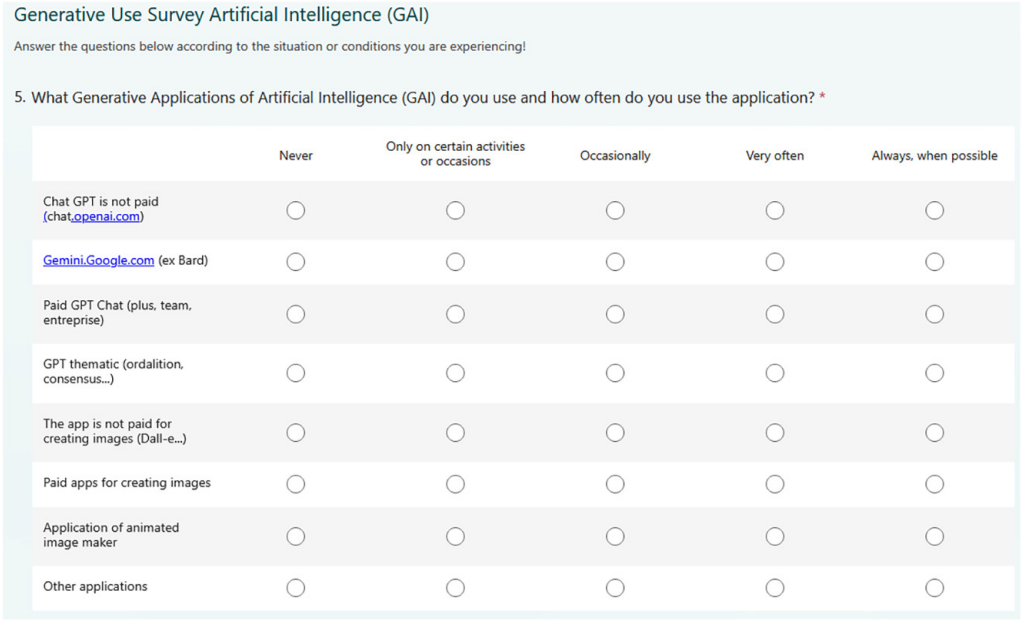
9 APPENDIX

Appendix presents the full questionnaire items, including their original sources and adaptation notes. These details provide a comprehensive reference to support the methodological rigor of the study.



Generative Use Survey Artificial Intelligence (GAI)

Answer the questions below according to the situation or conditions you are experiencing!

5. What Generative Applications of Artificial Intelligence (GAI) do you use and how often do you use the application? *

	Never	Only on certain activities or occasions	Occasionally	Very often	Always, when possible
Chat GPT is not paid (chat.openai.com)	○	○	○	○	○
Gemini.Google.com (ex Bard)	○	○	○	○	○
Paid GPT Chat (plus, team, entreprise)	○	○	○	○	○
GPT thematic (ordalition, consensus...)	○	○	○	○	○
The app is not paid for creating images (Dall-e...)	○	○	○	○	○
Paid apps for creating images	○	○	○	○	○
Application of animated image maker	○	○	○	○	○
Other applications	○	○	○	○	○

6 In what context do you use the application? *

	Never	Only on certain activities or occasions	Occasionally	Very often	Always, when possible
As part of my studies	○	○	○	○	○
As part of my professional activity	○	○	○	○	○
For my personal benefit	○	○	○	○	○
As part of my work in a community or as an activist	○	○	○	○	○

7. What purpose do you use this application? *

	Never	Only on certain activities or occasions	Occasionally	Very often	Always, when possible
As a search engine	○	○	○	○	○
To find a definition	○	○	○	○	○
To translate the text	○	○	○	○	○
To understand the text	○	○	○	○	○
To make a summary	○	○	○	○	○
To string words	○	○	○	○	○
To correct spelling or grammar	○	○	○	○	○
To find ideas or solutions	○	○	○	○	○
To create content or images	○	○	○	○	○
As a source of inspiration	○	○	○	○	○
For other uses that I will explain below	○	○	○	○	○

8 If you use this app for another purpose, write down two or three words describing it. *

Enter your answer

9. How long have you used this app? *

Never	Less than a month	2 - 6 months	6 - 12 months	> 1 year
○	○	○	○	○

10. Write in one, two, or three words how you learn to use the application (tutorial, course, or otherwise...) *

Enter your answer

11. Describe your perception of the use of the GAI app? *

- ○ Positive
- ○ Negative
- ○ Depends on
- ○ Others

12. Name one, two, or three words that can clarify your perception of the use of the GAI app *

Enter your answer

13. If you have any concerns about using the GAI app, mention one, two, or three words describing it? *

Enter your answer

14. If you have an idea to perfect the GAI app, explain in two or three words can describe your idea *

Enter your answer

15. When you use the GAI application as part of a presentation or task related to the study/job, do you mention/improve the use of the application? *

- ◯ Never
- ◯ Only on certain activities or occasions
- ◯ Occasionally
- ◯ Frequently
- ◯ Always
- ◯ No answer

16. When you use the GAI app, do you have a dialogue with the app to fine-tune the answers you get from your questions? *

- ◯ Never
- ◯ Only on certain activities or occasions
- ◯ Occasionally
- ◯ Frequently
- ◯ Always
- ◯ No answer

17. When you use the GAI app, do you check the answers given using in other ways/apps? *

- ◯ Never
- ◯ Only on certain activities or occasions
- ◯ Occasionally
- ◯ Frequently
- ◯ Always
- ◯ No answer

18. Have you ever used this app with someone else (e.g. in group work)? *

- ◯ Never
- ◯ Only on certain activities or occasions
- ◯ Occasionally
- ◯ Frequently
- ◯ Always
- ◯ No answer

19. Are there any teachers, lecturers, coaches, supervisors, or mentors who have talked about the GAI app with you? *

- ◯ Never
- ◯ Only on certain activities or occasions
- ◯ On several occasions
- ◯ Frequently
- ◯ Always: when possible

20. Do they encourage you to use it? *

- ◯ Never
- ◯ Only on certain activities or occasions
- ◯ On several occasions
- ◯ Frequently
- ◯ Always: when possible
- ◯ No answer

21. Do you know the rules that must be considered when using the application? *

- ◯ No
- ◯ Yes, in general
- ◯ Yes
- ◯ I don't remember

22. If you are aware of any rules related to the use of the GAI application, describe the rules in a few words. *

Enter your answer

23. Mention the level of education that you are currently taking *

- S1
- S2
- S3
- D3
- D4
- Others

24. Mention the name of your current study and university/educational/educational institution *

Enter your answer

25. If you are a student at Yogyakarta State University, mention the name of your faculty

Select your answer

26. If you are a student at the Cilacap State Polytechnic, mention the name of your major

Select your answer

27. How old are you? *

- Less than 20 years
- 20-23 years
- 24-30 years
- 31-50 years
- more than 50 years

28. In two or three words, where do you know about this survey? *

Enter your answer

29. Do you want to give a response about this survey? Thank you. *

Enter your answer

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10 AUTHORS

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