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Graduate students and AI: Insights into academic writing practices

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ABSTRACT

This study aims to examine graduate students' perceptions of artificial intelligence–based tools, their practices in using these tools during academic writing processes, and their ethical evaluations related to such use. The research was conducted using qualitative research design. Data was collected through semi-structured interviews with 11 graduate students, and content analysis was employed to analyze the data. The analysis yielded four main themes covering the purposes of AI tool usage, their contributions to academic achievement and learning experience, limitations encountered during use, and ethical considerations. The findings show that students use AI tools intensively, particularly in processes such as literature review, writing and language development, idea generation, and structural framework creation. It was also determined that AI saves time, increases academic productivity, and supports the learning process. However, loss of originality, verifiability issues, content errors, and ethical sensitivities were expressed by students as significant limitations. Participants stated that these tools help them save time, contribute to idea generation, and support written expression. However, some participants emphasized the importance of using AI tools cautiously in terms of originality, accuracy, and ethical considerations. They expressed concerns that relying entirely on these systems for content generation may lead to uncertainty or ambiguity. Overall participants perceive AI tools as supportive instruments and emphasize that they should be used carefully and responsibly.

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Introduction

Emerging from Alan Turing's fundamental question in the 1980s "Can machines think?" AI technologies (Turing, 1950) have evolved into systems capable of imitating human intelligence through complex algorithms, resulting in a wide range of applications (as cited in Russell & Norvig, 2020). One of these application domains is the education sector. Education has become an area in which AI is rapidly integrated and visibly influential. This rapid development and integration have profoundly transformed teaching and learning processes within educational institutions (Akşab & Seggie, 2024). Initially adopted through computer-based technologies, AI in education has evolved toward web-based and online intelligent learning systems, followed by the emergence of tools such as embedded computer systems, humanoid robots, and chatbots that support instructional tasks (Chen et al., 2020). These technologies not only streamline instructors' administrative responsibilities but also personalize curricula and instructional content in line with students' needs through machine learning and adaptive algorithms, thereby significantly improving the learning experience and overall educational quality (VanLehn, 2011). As emphasized by UNESCO (2021), such developments contribute to inclusive and sustainable education.

AI plays an active role at all levels of education; however, its use in graduate education differs qualitatively from other educational stages. At this level, AI is not merely a tool that facilitates access to information; rather, it assumes a transformative role by encouraging original contributions, enriching methodological approaches, and introducing new standards regarding academic ethics. Consequently, these emerging ethical standards have necessitated the swift development of formal guidance at the institutional level. In this regard, the Scientific and Technological Research Council of Turkey (TÜBİTAK), Turkey's most authoritative scientific institution, addressed this technological shift with a proactive approach at the national level by publishing the Guide for the Responsible and Reliable Use of Generative Artificial Intelligence in Support Processes (TÜBİTAK, 2025) in September 2025; while acknowledging the transformative power of AI, the guide outlines a clear ethical framework aimed at preserving the fundamental integrity of scientific research. It is within the context of this official institutional framework that the use of AI in graduate education possesses a multidimensional structure that needs to be addressed not only through its technical support but also through its ethical, legal, and pedagogical dimensions. AI tools can serve as supportive and complementary components in the academic writing process at the higher education level (Altıntop, 2023). Academic writing forms the foundation of scholarly communication and is shaped through theses and scientific articles. A scholarly manuscript typically consists of an original title, an abstract summarizing the study, an introduction highlighting the aim and significance, a literature review presenting critical analysis of prior studies, a methodology section explaining the research design, a discussion in which findings are interpreted, a conclusion summarizing key implications, and a reference list.

In the context of academic writing in graduate education, AI is used across multiple stages, including literature review, writing and language enhancement, reference management and formatting, as well as feedback and revision (Alsamhori & Alnaimat, 2024; Uslu, 2023; Vural Yılmaz, 2023). AI-powered research tools enable students to quickly identify relevant articles, generate keyword suggestions, and analyze emerging research trends (Han, 2025). Large language models such as GPT-4 assist users in drafting texts, simplifying complex concepts, and correcting grammatical errors (Kasneci et al., 2023). Additionally, AI-assisted systems such as Zotero or Mendeley facilitate automated citation generation and reference formatting (Gumpenberger et al., 2022). In this regard, it becomes important to understand which stages of academic writing AI tools are used for and for what purposes.

The integration of AI into graduate education also raises ethical and administrative concerns. Issues such as loss of professional roles, data privacy, changes in human interaction, commercialization, and the weakening of critical thinking skills have been widely discussed (Benzer & Benzer, 2021; Yakut et al., 2025; Yeşilyurt et al., 2024). In academic writing, AI-driven language models introduce several concerns. Uncertainty exists regarding which databases these tools draw upon, whether they adopt a particular perspective when generating content, how reliably they access academic sources, and whether their outputs contain inherent biases (Büyükada, 2024). Moreover, frequent use of AI tools may contribute to problems of originality and plagiarism (Okun et al., 2023). Therefore, to ensure the accuracy and reliability of academic content, authors must critically evaluate AI-generated outputs and cross-check them with credible sources. These technical and ethical debates demonstrate that AI tools are not merely practical assistants but have become influential actors shaping educational processes.

As the use of technology in education becomes increasingly widespread, graduate students' learning and research activities are directly affected. With the growing accessibility of AI tools, their use in academic writing, literature review, and text editing has become more common. However, little is known about how these tools are used, how students benefit from them, and what thoughts or reflections emerge throughout this process. Thus, it is crucial to investigate the types of AI tools preferred by graduate students and the purposes for which they use them. Understanding students' experiences and challenges will guide future research and inform institutional support and policy planning.

The present study aims to explore graduate students' perspectives, experiences, and perceptions regarding the role of AI in academic processes within a qualitative research approach. In line with this aim, the study seeks to answer the following research questions:

1. What are graduate students' views regarding the AI tools they prefer in their academic work and the purposes for which they use them?
2. What are graduate students' perceptions of the effects of AI tools on their academic success and learning experiences?
3. What limitations do graduate students encounter when using AI tools?
4. How do graduate students evaluate the use of AI tools from an ethical perspective?

Method

Research design

In this study, a qualitative research paradigm was adopted to explore graduate students' perspectives on the use of artificial intelligence (AI) in depth. Qualitative research provides a strong framework for understanding individuals' experiences, thoughts, and the meanings attributed to those thoughts (Yıldırım & Şimşek, 2018). Accordingly, the study aimed to reveal participants' personal perceptions and experiences regarding AI comprehensively.

A basic qualitative research design was employed, as it focuses on discovering the meanings individuals derive from their experiences and examining how those meanings are constructed. Widely used in the field of education, this design allows researchers to investigate how individuals interpret their experiences within their own contexts (Merriam & Grenier, 2019). For this reason, the basic qualitative research design was deemed appropriate to gain an in-depth understanding of graduate students' perceptions of AI.

Working group

The underlying logic of qualitative sampling is to purposefully select participants who can best contribute to understanding the research problem and questions (Creswell & Creswell, 2021). In this study, participants were selected using convenience sampling, one of the purposeful sampling strategies. Convenience sampling enables the inclusion of participants who are easily accessible to the researcher, thus providing practicality and efficiency (Yıldırım & Şimşek, 2018).

In line with this approach, the study group consisted of 11 graduate students enrolled in the primary education and early childhood education programs at Ordu University during the 2024–2025 Spring semester. Demographic information regarding the participants is presented in Table 1.

Table 1. Demographic Information of the Participants

Code	Gender	Program Name	Degree Level
P1	Female	Early Childhood Education	Master's
P2	Male	Primary School Education	Master's
P3	Female	Early Childhood Education	Master's
P4	Female	Early Childhood Education	Master's
P5	Female	Primary School Education	Master's
P6	Female	Primary School Education	Master's
P7	Female	Early Childhood Education	Master's
P8	Female	Early Childhood Education	Master's
P9	Female	Primary School Education	Master's
P10	Female	Primary School Education	Master's
P11	Female	Primary School Education	PhD / Doctorate

Data collection instruments and procedure

A semi-structured interview form was used as the data collection instrument. In developing the interview form, a literature review was conducted, potential interview questions were drafted, and these questions were submitted to experts in Primary Education and Early Childhood Education for evaluation. Based on expert feedback, the final version of the form included seven open-ended questions. Examples of the interview questions are presented below:

1. Which AI tools do you use during your graduate studies?
2. How do you evaluate the use of AI-supported tools in academic writing from an ethical perspective?

Data was collected through face-to-face interviews with four participants, while the remaining participants completed an open-ended written form prepared via Google Forms. The data collection process lasted approximately two weeks. For the face-to-face interviews, audio recordings were taken with participants' permission. Audio data were transcribed verbatim, and written responses gathered through the online form were transferred directly into Microsoft Word. Data obtained from one participant through the written form were excluded from analysis due to insufficient content.

Using two different data collection modes allowed flexibility in reaching participants while preserving consistency in the research questions. Face-to-face interviews enabled clarification of questions and facilitated more detailed and in-depth responses through direct interaction, whereas the open-ended written form allowed participants to respond independently and reflectively in a standardized format. Methodological literature indicates that different data collection modes may influence the depth and form of responses; therefore, these differences were taken into consideration during the analysis process to

ensure coherence and credibility of the findings (Creswell, 2013; Kvale & Brinkmann, 2009; Tisdell et al., 2025).

Data analysis

The qualitative data obtained in this study were analyzed using content analysis. Content analysis is not merely a process of classifying texts; it is an in-depth analytic approach that uncovers latent layers of meaning in participants' statements and enables interpretation of those meanings within the study's context (Schreier, 2012). In line with this approach, the dataset was examined meticulously, meaningful units of text were coded, and similar codes were grouped to form categories. The coding process was conducted to both align with the research questions and faithfully reflect participants' unique perspectives.

To enhance the reliability of the coding process, an external subject-matter expert was included alongside the researchers. Coding performed by the two coders was compared, and any discrepancies were discussed until consensus was reached. This procedure aimed at reducing interpretive subjectivity during analysis. Each step of the study (development of the data collection instrument, data collection, analysis, and presentation of results) was described in detail to support confirmability. Additionally, findings were substantiated with direct participant quotations to strengthen internal consistency. Clearly reporting participants' demographic characteristics and transparently documenting the process by which categories were derived further contributed to the study's validity and reliability.

Results

The data obtained for the first research question are presented in Table 2 and Table 3.

Table 2 displays the AI tools preferred by the participants and the participants who reported using them.

Table 2. Preferred AI Tools

AI Tools	Participant
ChatGPT	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11
Gemini	P2, P3, P7, P8, P11
DeepSeek	P2, P6
Nebkin	P3
Canva	P3
Blackbox	P10
Piri AI	P10
Deeply	P11

Graduate students participating in the study reported that the most frequently used AI tool was ChatGPT. All participants (P1–P11) stated that they actively used this tool during their academic writing processes. Gemini emerged as the second most preferred tool. In addition, tools such as DeepSeek, Nebkin, Canva, Blackbox, Piri AI, and Deeply were used less frequently.

Table 3 presents the main categories, subcategories, and participants regarding the purposes for which AI tools were used.

Table 3. Purposes of Using AI Tools

Main Category	Subcategory	Participants
Support in the Writing Process	Creating a structural outline for the research text	P1, P7, P9, P10
	Writing and language improvement	P2, P5, P10, P11
	Reference checking	P5
	Translation	P6, P11
	Visual design support	P3
Research Design and Planning	Developing the flow of the conceptual framework	P1, P3, P4, P5
	Writing the purpose and significance of the study	P10
	Formulating research questions	P11
	Guidance during the academic writing process	P9, P10
Access to Information and Content Development	Literature review	P1, P2, P3, P4, P5, P6, P7, P8, P9, P10, P11
	Developing initial ideas regarding the topic	P1, P4, P7, P9
	Quick access to information	P2, P8

Support for Data Analysis and Findings	Data analysis	P5, P11
	Interpretation of research findings	P9

The data obtained for the first research questions were gathered under four main categories based on content analysis: support in the writing process, research planning and guidance, access to information and content development, and support for data analysis and interpretation.

In the category of support in the writing process, participants reported that they used AI tools to create a structural outline for their research text, improve writing and language quality, check references, translate text, and obtain visual support. For example, P9 highlighted the contribution of AI to structural organization, stating: "*I ask it to provide examples regarding the order of the sections of an article and what each section should include, and it helps me at that point.*" Similarly, P2 emphasized the contribution of AI to writing and language quality: "*Because I am curious about how ChatGPT and DeepSeek construct sentence structures, I use both systems comparatively; this helps me test whether they can use a more academic language.*"

Under the research design and planning category, participants indicated that they benefited from AI to develop the flow of the conceptual framework, write the purpose and significance of the study, formulate research questions, and receive guidance throughout the academic writing process. For instance, P9 stated: "*It is a good guide especially for students who do not yet have an academic writing style; it is very useful in analyzing aspects we cannot see and offering different perspectives.*" Likewise, P4 reflected on how AI helped develop the conceptual framework: "*Let me put it this way: in the introduction we need to start from one point and move toward details. While doing that, I sometimes don't know where to begin. Where should I refer to first? Where should I move next? When I cannot gather my ideas, I refer to AI. It supports me a lot in the introduction section.*"

In the access to information and content development category, participants reported actively using AI tools for literature review, generating preliminary ideas about the research topic, and quick access to information. All participants stated that they used AI when conducting literature searches. The statements of P2, P8, and P11 illustrate this:

"*I mostly use it to find studies related to my research topic. Sometimes I can't access foreign sources, or I cannot find them. I can't immediately reach them on ERIC or foreign journal platforms, but ChatGPT finds them very well. It finds them quickly. As it finds exactly what I need, I use it to find studies for my introduction section, in different languages, from different countries.*" (P2)

"*When I need to work on a specific topic and quickly access more detailed areas, I benefit from it.*" (P8). "*I use it in literature review and analysis parts.*" (P11). Regarding preliminary idea development, P1 explained: "*It shows the way; it opens my mind, gives me an idea of how to begin. Then I continue writing in my own style.*". In support of data analysis and interpretation category, P5, P11, and P9 reported using AI for data analysis and interpretation of research findings.

Data regarding the effects of AI tools on academic achievement and learning experiences are presented in Table 4.

Table 4. Effects of AI Tools on Academic Achievement and Learning Experiences

Main Category	Subcategory	Participants
Supportive Effects on Learning	Idea generation	P1, P4, P5, P7, P9, P10
	Guiding role	P1, P2, P9
	Supportive function	P1, P3, P10
	Instructional role	P4
	Enhancing critical thinking	P5, P10
	Contribution to researcher identity	P10
Contribution to Academic Writing and Productivity	Supporting academic productivity	P1, P3, P5, P8
	Time saving	P3, P5, P8, P11
	Development of academic language	P2, P10
	Enhancing creativity	P1, P4, P6, P7, P10

Based on content analysis, the data were grouped under two main categories: supportive effects on learning and contributions to academic writing and productivity. Within the supportive effects on learning category, participants highlighted benefits such as idea generation, guidance, supportive function, instructional role, enhancement of critical thinking, and contribution to their researcher identity. For instance, P3 emphasized the supportive role of AI by stating: "*When I think about individual writing processes, maybe it does not act as a guide, but it supports me in the direction I want to proceed. When I get stuck and ask questions, it helps shape my thinking.*" Similarly, P10 explained how AI contributed to developing a researcher identity: "*AI does not*

overshadow my writing; on the contrary, it strengthens it. It gives me answers from different perspectives, which helps me notice aspects I had never considered and view my work from a broader perspective."

Under the contributions to academic writing category, participants mentioned support for structuring academic texts, improving language quality, and receiving guidance during writing. In the contributions to productivity skills category, they referred to saving time, stimulating creativity, and supporting overall productivity. For example, P8 stated: "*I think it strengthens me; at least it supports me by providing efficiency in terms of time."* P7 emphasized creativity: "*When I need to get ideas or when my creativity decreases, getting support strengthens me and helps me see things from another perspective."* Finally, P2 reflected on how AI enhances productivity by helping process text more efficiently: "*I cannot quickly read an entire study or multiple studies and produce an introduction or paragraph immediately. But by summarizing the parts I need with ChatGPT and reading them carefully, I can write something myself. Its impact is significant."*

The data regarding the limitations experienced during the use of AI tools are presented in Table 5.

Table 5. Limitations Encountered in the Use of AI Tools

Main Category	Subcategory	Participants
Content and Language Issues	Problems in sentence structure	P1
	Insufficient Turkish content	P1
	Lack of citations	P1
	Inability to provide verifiable sources	P1, P2, P11
	Incorrect or incomplete information	P1, P2, P7
Originality and Academic Consistency	Lack of originality	P2, P3, P9, P11
	Limited contribution to qualitative analysis	P2
	Confusion in academic framework	P2
	Weakening of researcher identity	P8, P9, P10
Usage Difficulties	Excessive dependence on prompts	P3
	Difficulty in distinguishing human vs. AI output	P3, P4
Ethical and Cognitive Concerns	Ethical concerns	P4, P11
	Hindering cognitive effort / diminishing mental engagement	P4, P5, P7, P9, P10

Based on content analysis, the data were grouped under four main categories: content and language issues, originality and academic consistency, usage difficulties, and ethical and cognitive concerns.

In the content and language issues category, participants emphasized limitations such as problems in sentence structure, insufficient Turkish data, lack of citations, inability to provide verifiable sources, and incorrect or incomplete information. For example, P2 referred to incorrect or unverifiable information by stating: "*Sometimes it generates incorrect references. It may still include page numbers even though they are not required in APA 7, or it may use outdated versions."* P2 also added: "*I use ChatGPT because it finds resources directly related to my topic, but sometimes I cannot be sure about the accuracy of its findings."* Similarly, P1 highlighted problems related to sentence structure and lack of Turkish sources: "*The sentence structure may sometimes be odd. I would want it to write in a style more suitable for academic Turkish."* and "*It provides more data in English. In Turkish, the data are more limited—you expect the same richness."*

Within the originality and academic consistency category, participants mentioned concerns such as lack of originality, limited contribution to qualitative analysis, confusion within the academic framework, and weakening of researcher identity. Regarding originality, P3 stated: "*In academic writing, I think it may cause problems because the produced text may not be original."* and P11 emphasized: "*Originality and academic integrity are serious issues that need to be questioned."* P9 pointed to the weakening of researcher identity: "*AI will always move faster than humans. I think it dulls some human abilities."*

In the usage difficulties category, participants mentioned excessive dependence on prompts and difficulty distinguishing human-generated text from AI-generated text. P3 explained excessive dependence by stating: "*The more detailed and explicit my command is, the clearer the answer becomes. We are now in an era where prompts must be very detailed. It would be better if it could give clear answers without needing extremely detailed prompts."* P4 addressed difficulty in distinguishing human and AI output: "*AI may blind authentic academic writing; people may start relying on it instead of writing themselves."*

Finally, within the ethical and cognitive concerns category, participants expressed ethical worries and the possibility that AI may diminish cognitive effort. P11 stated: "*While AI facilitates productivity and thinking, it may also lead to laziness in individual idea generation."*

The data regarding the ethical evaluation of AI tool usage is presented in Table 6.

Table 6. Ethical Evaluation of AI Tool Usage

Main Category	Subcategory	Participants
Ethically Appropriate Use	Use as a supportive tool	P1, P4, P5, P7, P8, P10, P11
	Use based on citation	P2
	Use for producing visual content	P3
	Evaluation within the framework of technological advancement	P2, P6
Ethically Inappropriate Use	Issues regarding originality and distinguishability of content	P3
	Direct transfer of generated content	P1, P7
	Producing entire texts solely through AI	P2, P4, P5, P8, P10
	Undermining fair academic competition	P9

Based on content analysis, the data were categorized under two main themes: finding the use of AI tools ethically appropriate and finding their use ethically inappropriate.

Within the ethically appropriate use category, participants emphasized using AI as a supportive tool, using it based on proper citation, and using it for generating visual content. Additionally, some participants evaluated AI usage as a natural outcome of technological advancement. Conversely, participants expressed concerns related to ethically inappropriate use, such as issues regarding originality and distinguishability of content, direct transfer of AI-generated text into academic work, producing an entire text exclusively through AI, and undermining fair academic competition.

P11 highlighted the appropriateness of using AI as a supportive element by stating: "*These tools should be seen as a 'supporting assistant'; the main intellectual and written effort should belong to the researcher.*"

On the other hand, P8 emphasized the ethical problem of outsourcing the full writing process to AI: "*There is a difference between writing an entire article with AI and using it only to benefit from certain parts. Using it only for literature search does not seem ethically problematic to me. However, having AI write the whole article is not ethical.*"

P2 viewed AI and digital tools as a natural result of technological advancement, stating: "*In the past, we used to do everything manually, but now tools like Google Forms make processes easier. It is now very easy to access global resources. This is not theft of effort — it is a convenience brought by the era. It saves time and increases efficiency.*" In contrast, P3 pointed to originality and distinguishability concerns, noting: "*I believe the academic writing process will completely transform. AI will be able to produce a full academic text. From an ethical standpoint, this will be negative because we won't be able to tell whether a text was written by AI or by a real person. In many cases, that's already happening.*"

Conclusions and discussion

The findings of this study reveal that graduate students use AI tools in a multidimensional and systematic manner. All participants reported using ChatGPT, indicating that this tool plays an active role in academic writing processes. Gemini was the second most frequently used AI tool. Studies in literature similarly highlight the prominence of ChatGPT in academic writing and research (Abdullah et al., 2025; Andika et al., 2025; Chauke et al., 2024; **Chris Winberg, et. al., 2024;** Hartman Douglas, 2024; Pratiwi et al., 2025). This supports the conclusion that ChatGPT has become a widely preferred and recognized AI tool in graduate-level academic research. However, beyond ChatGPT, several other AI tools are available to assist with language editing, paraphrasing, reference checking, and visual material creation. The findings suggest that graduate students need guidance and training on the variety of AI tools they can use during academic writing.

Regarding the purposes of using AI tools, participants stated that they used them for literature review, idea generation, structuring the conceptual framework, and language refinement. AI's ability to rapidly scan academic information across multiple digital platforms and present synthesized outputs was cited as a major benefit. Similar results were found in Chauke et al.'s (2024) study, which reported that AI supported graduate students by improving the speed and efficiency of research, facilitating access to existing studies, detecting language errors, reformulating academic text, and guiding them on how to structure research. Likewise, Andika et al. (2025) found that students frequently used ChatGPT to paraphrase and express ideas more effectively. The findings of this study align with those results, suggesting that AI tools are now becoming not only technical assistants but also natural components of academic knowledge production.

Regarding the effects of AI on academic achievement and learning experiences, participants emphasized that AI supports idea development, enhances creativity, facilitates academic productivity, and saves time. These findings suggest that AI functions as a cognitive partner that reduces mental workload during

academic writing. Similar results in the literature indicate that AI improves performance, increases efficiency, supports time management, and enhances academic writing quality (Chauke et al., 2024; Oubibi et al., 2025; Shimray & Subaveerapandiyan, 2025; Tran et al., 2025). Although no direct findings on motivation emerged in this study, Eltahir and Babiker (2024) demonstrated that AI may affect academic motivation. Taken together, the results suggest that AI tools function as new "mentors" in the learning process.

Findings also indicate that students experience several limitations when using AI tools. These include lack of originality, weakening of researcher identity, incorrect or unverifiable information, insufficient Turkish-language data, and limited contribution to qualitative analysis. The increased reliance on AI, even for simple tasks, may lead to reduced creativity and weakened problem-solving skills. Davis (2024) argues that no AI tool can replicate human cognitive abilities and advanced social skills. Similarly, Michel-Villarreal et al. (2023) and Saienko et al. (2025) report limitations such as algorithmic bias, concerns about privacy, reduced intellectual engagement, and inability to grasp emotional or ethical nuances. Saienko et al. (2025) further notes that although AI can produce text based on large datasets, it cannot fully understand philosophical depth or contextual meaning a limitation particularly relevant in humanities and social sciences. These findings indicate that balanced and strategic use of AI is essential.

Finally, participants' ethical evaluations revealed two perspectives: ethical use and unethical use. Most participants found AI ethically appropriate when used as a supporting tool—provided the intellectual contribution belonged to the researcher. However, producing entire texts through AI and directly transferring AI-generated output into academic work were considered unethical. Participants valued originality, academic integrity, and personal effort. These findings align with Pratiwi et al. (2025), who emphasize that AI use must be transparent, limited to supportive functions, and explicitly acknowledged. Mwita and **Mwilongo** (2025) also identifies the distinction between ethical and unethical use, stating that AI should support idea generation but should not replace authorship.

The widespread use of artificial intelligence tools in academic writing also raises critical questions regarding plagiarism detection practices. Traditional plagiarism detection systems primarily rely on similarity-based algorithms that compare submitted texts with existing sources. However, content generated by artificial intelligence often produces linguistically original outputs, which limits the effectiveness of these systems in identifying AI-assisted writing. For example, in their study, Casal and Kessler (2023) asked experienced raters to distinguish between texts written by human authors and those generated by artificial intelligence. Their findings revealed that evaluators correctly identified human-written texts at a rate of 44.1%, whereas AI-generated (ChatGPT) texts were correctly identified at a rate of 33.7%. Notably, the evaluators reported greater success in identifying human-authored texts than AI-generated ones.

As a result, regulating the use of artificial intelligence in academic writing should not rely solely on technical detection mechanisms but should instead be grounded in ethical awareness, transparent disclosure practices, and clear institutional guidelines. The findings of this study align with this perspective, as participants emphasized that artificial intelligence should function as a supportive tool rather than a substitute for intellectual contribution. One of the prominent contributions of artificial intelligence in education is its capacity to adapt learning processes to individual characteristics. AI-based tools provide personalized support and resources by considering students' learning pace and individual needs, thereby facilitating a more effective understanding of complex concepts (Kudritskaya et al., 2024).

This study demonstrates that graduate students actively and purposefully use AI tools throughout the academic writing process. AI tools enhance productivity, support learning, facilitate literature review, and reduce the cognitive effort required in academic writing. However, concerns remain regarding originality, ethical use, excessive dependence, and weakening of researcher identity.

Overall, AI tools function as supportive assistants but should not replace human intellectual contribution.

Recommendations

Based on the findings, the following recommendations are offered:

1. Provide explicit guidelines on how AI tools should be used in academic writing processes.
2. These guidelines should center on the principle that AI is only a tool, as defined by the TÜBİTAK Guide (2025); while allowing supportive uses such as grammar correction, they should strictly prohibit actions such as generating original data (scientific fraud) and uploading confidential data to publicly available AI tools. This will ensure that students have a clear boundary regarding AI usage.

3. Develop coursework or workshop modules at the graduate level focusing on ethical and responsible AI usage. These training sessions should focus on the key risks highlighted in the TÜBİTAK Guide (2025): hallucination, algorithmic bias, and intellectual property (IP) infringements.
4. Encourage students to disclose AI support transparently in academic writing (e.g., in acknowledgments or methodology sections). Universities should require a methodology section standard that details the name, version, and scope of use of the tool in all cases where AI is "Significantly Used" (such as draft creation, code assistance), based on the "Declaration Requirement" clause in TÜBİTAK's (2025) guidelines.
5. Ensure supervisors are trained in AI literacy to properly guide students. These training sessions should focus consultants on the principle of "Human Responsibility and Oversight," which is a fundamental principle of TÜBİTAK (2025).
6. Universities should take measures to ensure fair and safe access to AI tools for all students.

Declarations

Competing interests

No potential conflict of interest was reported by the author(s).

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Authors' contributions

Two authors took equal part in the conduct and reporting of the research.

Artificial intelligence

During the preparation of this manuscript, ChatGPT (GPT-5) was used only for language editing, expression improvement, and technical support during the content analysis process. The AI tool did not intervene in the research design, data collection, interpretation of the results, or the decision-making process related to the overall writing of the study. All interpretations, decisions, and analytical results are the sole responsibility of the authors.

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