Pedagogical Challenges of Generative AI in Academic Writing

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Abstract. This review looks at the challenges and methods for using generative AI in academic writing across many subjects. Recent studies (2023–2024) that used mixed methods, case studies, and theory show many ways AI is used in schools. Students use AI tools for brainstorming, creating ideas, and check-ng their work [1]. There are problems with academic honesty, basic learning, and grading methods [2]. In science and tech, AI-written text can sometimes match or even be better than student work. In subjects like history and literature, it is hard to keep a student's unique voice and style [3]. Students and teachers see AI very differently. This gap grows because schools do not give enough training and the rules are not clear [4]. Studies show that AI affects each sub-ject in its own way. There are concerns about keeping work real and helping students think clearly [5].

Keywords: Generative AI · Academic Writing · Academic Integrity

1 Introduction

Generative AI tools in higher education have changed the usual ways of teaching academic writing. This change brings new chances and challenges in how teachers work. As these tools get better and easier to use, schools must decide how to use them in college teaching [6].

These tools help with everything from coming up with ideas to organizing work and fixing grammar mistakes [1]. Even though AI makes writing easier, it also brings up real concerns. Educators worry about keeping academic standards high and making sure students truly learn, not just rely on AI.

The issues go beyond technical matters and raise questions about how we should teach writing when AI plays such a big role in education. Teachers and schools are working to balance using these tools while keeping the main goal of writing education [8].

Students and teachers see AI in writing very differently. Students are mostly positive about these tools and see them as a helpful part of writing [4]. They like that AI can help with coming up with ideas, creating drafts, and checking work [3].

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Teachers worry about AI in their classes. They fear cheating, the loss of proper writing skills, and that students may depend too much on AI [4]. The issue is harder because many schools do not have clear rules for using AI.

Teachers do not get enough training on these tools, and there is no standard way to grade writing when AI is used [6]. This difference in how students and teachers view AI makes it hard to develop teaching methods that work for everyone.

AI affects college subjects in different ways, bringing both issues and benefits to each field. In technical subjects like computer science and engineering, AI can sometimes write papers that match or even surpass the quality of student work [8]. This leads to questions about how to grade student work and what the true goal of teaching in these subjects should be [5].

Humanities courses face clear challenges. They must keep each student's own voice, grow creative work, and keep the realness of student work [2]. Writing classes have trouble balancing help from AI with the basic goal of building students' own writing skills [5].

Each subject has its own issues that need special plans for using AI. These plans must fit different teaching needs and learning goals. Research shows we need clear rules for ethics, grading work, and teaching changes [9].

Studies list key parts for success: clear school rules on AI, strong teacher training, classes to build AI skills, grading methods that include AI, and firm ethical rules [6]. Making these plans takes care to match what the technology can do with how teaching works.

AI helps students learn without lowering the quality of education. Recent studies show that to succeed, we must set clear limits on using AI and teach students to think and write on their own [1].

This study examines the challenges that AI tools bring to college writing classes. It considers ten recent studies that use different methods and cover various subjects.

The work focuses on key areas: finding good ways to use these tools, noting differences in AI use among subjects, setting clear rules for fair use, and testing new teaching ideas.

This review collects results from several studies. It shows clear ways to keep school work honest when using AI for writing in class. It brings together findings from many studies and explains how to keep learning fair while using AI's benefits.

The study stresses a balanced approach to builds critical thinking, keeps student choice, and changes old tests to include AI tools [5]. This review of current evidence aims to guide school rules and teaching methods in a world with more AI.

2 Generative AI in Academic Writing

Generative AI is a new tool that changes how college students write. It brings both help and problems for students and teachers. These tools work well for tasks like brainstorming, coming up with ideas, and handling basic writing tasks [10, 11].

This AI uses models such as Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs) to study large sets of data and produce similar content [12].

It is used in many areas like healthcare, movies, and education [13]. Unlike older AI systems that follow set tasks, this tool makes new data on its own.

It is changing work and how we talk to each other [14]. It may also improve search tools and the way we create information in the metaverse era [15]. At the same time, it raises issues about privacy and fairness [13].

Generative AI has grown a lot. Key changes include neural networks, language models, and ways to create images [16]. New tools like ChatGPT and DALL-E let anyone use strong language tech, which helps people make work that sounds very human [1].

These tools work in many areas. They help computers read images and text and assist in health care and business decisions. This technology is exciting, but it also brings up serious ethical issues, such as fake content and the safe use of these tools [6].

As AI gets better, it affects many fields. We must think about the new tools and the ethical risks [5]. In schools, tools like ChatGPT change how students write and do research. They help students work faster, spark new ideas, and let them share their thoughts clearly [2], but they also bring challenges for both teachers and students [4].

The goal is to use AI as a tool that supports learning while keeping true academic work and real understanding [3]. Using AI tools raises concerns about academic honesty and the truth of scholarly work [17, 18].

Generative AI may ease some academic work but can also make current problems in higher education worse [19]. Universities are handling this by enforcing rules on academic honesty, teaching those involved, and finding ways to use AI responsibly [20]. In tourism and hospitality research, AI tools can change how data is collected and studied while raising ethical issues.

As the landscape evolves, there is a need for ongoing discussions about the ethical use of AI in academia, emphasizing human intelligence and critical [21].

3 Methodology

The method used in this study was shaped by the research question: "What are the specific pedagogical challenges introduced by generative AI technologies in undergraduate academic writing across different disciplines?".

To explore this, we carried out a systematic review of current researches following the PRISMA approach to ensuring the transparency and rigor of this process.

3.1 Review Strategy

The review adhered to the four standard stages outlined by the PRISMA model: identification, screening, eligibility, and inclusion. These procedures facilitated the acquisition of recent and pertinent studies that investigate the application of generative AI in academic writing.

3.2 Data Sources and Search Terms

We used two well-known academic databases, Scopus and Web of Science (WoS), because they offer a wide range of peer-reviewed studies in education and technology. The search used combinations of these keywords:

– “generative AI” OR “artificial intelligence”
– “academic writing” OR “undergraduate writing”
– “higher education” OR “undergraduate education”
– “pedagogy” OR “teaching” OR “instruction”

These keywords were chosen to focus the search on how generative AI is being used in writing courses in higher education and to identify studies that explore teaching and learning impacts.

3.3 Inclusion and Exclusion Criteria

In this step, we used strict inclusion and exclusion criteria for publication date, context, scope, study type, and educational setting to guarantee the relevance and quality of the studies in this review.

Inclusion Criteria

– Published between 2023 and 2024;
– Focus on undergraduate academic writing;
– Address pedagogical challenges, implementations, or experiences with generative AI;
– Include empirical research, theoretical analysis, systematic reviews, or case studies;
– Context: higher education;
– Language: English.
– Exclusion Criteria:
– Solely technical studies without pedagogical relevance;
– Focused on K-12 or postgraduate education;
– Published before 2023;
– Provided insufficient methodological detail or only preliminary findings.

Exclusion Criteria

– Solely technical studies without pedagogical relevance;
– Focused on K-12 or postgraduate education;
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3.4 Selection Process

A total of 148 studies were found through database searches. After removing duplicates, 63 studies were left for full-text review. From these, 28 articles did not meet the eligibility criteria and were excluded. The final review was based on 10 peer-reviewed studies. This process is shown in the PRISMA flow diagram below. (Fig. 1).

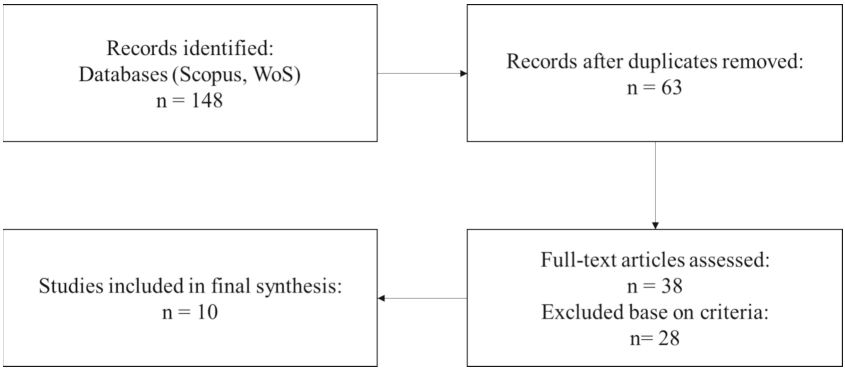

Fig. 1. PRISMA Flow Diagram, Integration of Generative AI in Academic Writing.

3.5 Quality Assessment

The included studies were evaluated based on:

- Methodological rigor;
- Relevance to the research question;
- Clarity of findings;
- Contribution to understanding pedagogical challenges;
- Applicability across disciplines.

3.6 Data Synthesis

A thematic synthesis approach was applied to analyze the diverse methodologies. The main themes that emerged were:

- Barriers to pedagogical integration of AI;
- Disciplinary differences in AI usage and challenges;
- Divergent student-teacher perceptions;
- Emerging pedagogical frameworks and implementation models.

We removed all studies that met the exclusion criteria we had set. This part of the process involved carefully reading the full texts of papers that seemed relevant and reviewing the quality of those that moved forward.

We assessed each study's quality by looking at five key points: how solid the methods were, how closely the study matched our research question, how clearly the findings were explained, whether it helped us understand the pedagogical challenges of AI, and if its conclusions could apply to more than one field.

These steps helped us keep the review focused on the topic while making sure we included research that was recent and relevant to how generative AI is affecting undergraduate academic writing.

In the end, we worked with 10 studies. The methods they used were diverse: we included 2 mixed-methods studies, 2 case studies, 2 theoretical or conceptual papers, and one each of a cross-sectional study, an action research project, a scoping review, and a phenomenological study.

The studies covered a range of subjects. Three looked at multiple disciplines, two focused directly on academic writing, and the rest explored areas like English composition, first-year writing, teacher education, and fields in science, economics, and higher education.

The pedagogical settings included first-year writing programs (3 studies), general undergraduate writing contexts (2 studies), and individual studies in workshops, teacher training programs, bachelor's degrees, and higher education settings.

We read and analyzed all the full-text studies included in the review. Our analysis was guided by recurring themes across the research. These included how AI is being used in writing tasks, what makes it difficult for educators to apply in practice, how these issues vary between disciplines, and the differences in how students and teachers experience and understand AI. We also looked at how new teaching approaches are starting to take shape in response to these changes.

4 Discussion: Pedagogical Implications and Future Directions

The synthesis of findings reveals several critical implications for the integration of generative AI in undergraduate writing. The persistent tension between technological assistance and authentic learning emerges as a central challenge, with multiple studies indicating that while AI tools can enhance idea generation and reduce cognitive load [1], they simultaneously raise concerns about skill development and academic integrity [8].

A significant finding warranting further discussion is the notable disconnect between student and faculty perspectives. While students generally demonstrate greater acceptance of AI tools [4], instructors express more substantial reservations about their impact on learning outcomes. This gap suggests a critical need for institutional dialogue and policy development to bridge these divergent viewpoints.

The cross-disciplinary analysis reveals that challenges manifest differently across academic fields. Technical disciplines face unique challenges in maintaining academic integrity when AI-generated content can match or exceed student work quality [8], while humanities-focused courses struggle more with preserving individual voice and creative expression [2].

Several key implications for practice emerge highlighting: the need for institutional framework development; faculty development requirements; and the assessment reform (Table 1).

The future research directions highlight:

(1) The investigation of effective assessment strategies in an AI-enabled environment.
(2) Realize longitudinal studies on the impact of AI integration on writing skill development.
(3) The evaluation of various pedagogical frameworks for AI integration.

As limitation, the current analysis primarily reflects early-stage implementation experiences and may not fully capture long-term implications or successful adaptation strategies.

This discussion framework contextualizes the findings within broader educational practice while highlighting critical areas for future investigation and development.

Table 1. Emerged key implications.

Key Implications	Description
Need for institutional framework development	Current findings suggest that institutions must develop comprehensive policies that address both ethical concerns and practical implementation guidelines [5]
Faculty development requirements	The identified gap in faculty preparedness indicates a pressing need for systematic professional development programs [7]
Assessment reform	Traditional assessment methods require significant revision to account for AI capabilities while maintaining educational integrity [8]

5 Results

The systematic review analyzed 10 studies that met the inclusion criteria. The methodological approaches varied considerably, comprising two mixed methods studies, two case studies, two theoretical/conceptual analyses, and individual studies using quantitative cross-sectional, action research, scoping review, and phenomenological approaches. The disciplinary distribution showed three studies focused on various disciplines, two on academic writing, and individual studies examining English composition, first-year writing, teacher education, scientific/economic disciplines, and higher education.

5.1 Primary Findings

The analysis revealed consistent patterns regarding AI tool utility across studies. Researchers found that AI tools provided significant benefits for brainstorming and idea generation [1], while also proving valuable for mechanical checks and proofreading tasks [7].

Students reported reduced cognitive load when utilizing these tools [3]. In terms of academic performance, a notable finding emerged showing that AI-generated papers scored higher than student-written work in certain disciplines [8], though students often expressed a preference for developing their own voice despite AI capabilities [2].

5.2 Thematic Analysis Results

The integration of AI into the writing process revealed several significant challenges. Primary concerns centered around balancing AI support with independent skill development [1], maintaining authenticity in student work [3], and adapting assessment methods to account for AI capabilities [8].

A notable divergence emerged between student and faculty perspectives, with students generally showing greater acceptance of AI tools [4], while faculty expressed more significant concerns about academic integrity and skill development [6].

Cross-disciplinary analysis revealed distinct patterns across academic fields. Technical disciplines reported higher performance of AI-generated content and faced specific

challenges in maintaining academic integrity [8]. In contrast, humanities-focused courses emphasized preserving student voice [2] and developing critical thinking skills [5].

5.3 Implementation Frameworks

The analysis identified five essential components for institutional guidelines: clear institutional policies, faculty training programs, AI literacy curriculum, adaptive assessment methods, and ethical use frameworks. Successful pedagogical implementation required self-regulated learning approaches [5], development of critical AI literacy [5], and modified assessment strategies [8].

Faculty development emerged as a crucial factor, with studies highlighting the need for training in AI tool integration [7] and understanding of ethical implications [9]. Implementation barriers manifested at both institutional and classroom levels.

At the institutional level, studies identified a lack of clear policies and guidelines [4] and insufficient faculty training resources [7].

Classroom-level challenges included difficulties in detecting AI-generated content, maintaining academic integrity, and adapting assessment methods to account for AI capabilities (Table 2).

Table 2. Key Components, Pedagogical Factors, and Implementation Barriers for Integrating Generative AI in Undergraduate Academic Writing.

Dimension	Component/Factor	References
Institutional Guidelines	Clear institutional policies	[3]
	Faculty training programs	[22]
	AI literacy curriculum	[4]
	Adaptive assessment methods	[6]
	Ethical use frameworks	[23]
Pedagogical Implementation	Self-regulated learning approaches	[4]
	Critical AI literacy	[4]
	Modified assessment strategies	[6]
Faculty Development	Training in AI tool integration	[22]
	Understanding ethical implications	[23]
Implementation Barriers	Lack of clear policies and guidelines (institutional)	[22]
	Insufficient faculty training resources (institutional)	
	Difficulty detecting AI-generated content (classroom)	
	Maintaining academic integrity (classroom)	
	Adapting assessment methods for AI (classroom)	

The findings collectively suggest that successful integration of generative AI in undergraduate academic writing requires a comprehensive approach addressing both institutional policy development and classroom-level implementation strategies. The evidence indicates that while AI tools offer significant potential benefits, their effective

integration demands careful consideration of pedagogical implications and systematic support structures.

6 Conclusions and Future Perspectives

The systematic review of recent studies reveals several crucial insights about the integration of generative AI in undergraduate academic writing. First, while AI tools demonstrate clear benefits for brainstorming and mechanical aspects of writing [1], their implementation presents significant challenges for maintaining academic integrity and developing authentic writing skills [6].

A notable finding is the persistent gap between student and faculty perspectives on AI use. Students generally show greater acceptance and appreciation for AI tools, while faculty members express more concerns about academic integrity and skill development [4]. This disconnect is exacerbated by insufficient institutional guidelines and inadequate faculty training [7].

The cross-disciplinary analysis reveals that while challenges vary across fields, common threads emerge regarding the need for balanced integration approaches. Technical disciplines face particular challenges in maintaining academic integrity [8], while humanities-focused courses emphasize preserving student voice and critical thinking [2].

The emerging pedagogical framework, incorporating clear institutional policies, faculty training, AI literacy curriculum, adaptive assessment methods, and ethical guidelines, provides a comprehensive approach to addressing these challenges [5]. However, successful implementation requires institutional commitment and systematic faculty development.

Respecting to the future perspectives, several key areas require further investigation and development: assessment innovation; faculty development; ethical framework evolution; cross-disciplinary applications; and student skill development. The following Table 3 gives detailed information.

Table 3. Key areas require further investigation and development.

Key areas	Description
Assessment Innovation	Development and validation of new assessment methods that effectively evaluate AI-assisted work Creation of rubrics that balance technological integration with skill development Research on the long-term impact of AI-integrated assessment approaches [6]

(*continued*)

Table 3. (*continued*)

Key areas	Description
Faculty Development	Design and evaluation of comprehensive faculty training programs Investigation of effective methods for building faculty confidence in AI integration Development of support systems for ongoing pedagogical adaptation [3]
Ethical Framework Evolution	Research on emerging ethical considerations as AI technology advances Development of more sophisticated plagiarism detection methods Investigation of best practices for maintaining academic integrity [5]
Cross-disciplinary Applications	Further study of discipline-specific challenges and solutions Investigation of transferable practices across fields Research on discipline-specific assessment adaptations [4]
Student Skill Development	Long-term studies on the impact of AI integration on writing skill development Research on effective methods for fostering critical thinking alongside AI use Investigation of strategies for maintaining student autonomy and creativity [1]

For future research, it would be important to examine the long-term impacts of AI integration on student learning outcomes and writing skill development. Additionally, attention should be paid to developing more sophisticated frameworks for ethical AI use that can adapt to rapidly evolving technology while maintaining academic integrity and educational quality.

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