Challenges and opportunities in the use of artificial intelligence in education for academic writing : A scoping review

Nurul Shofiah[1*], Zulmy Faqihuddin Putera[2], Novia Solichah[3]

[1,3] Department of Psychology, Faculty Psychology, Universitas Islam Negeri Maulana Malik Ibrahim, Malang, Jawa Timur, Indonesia
[2] Department of Civil Engenering, Politeknik Negeri Malang Malang, Jawa Timur, Indonesia
*nurulshofiah@uin-malang.ac.id

Abstract. Artificial intelligence in education emerged as a highly significant and transformational technological advancement. Academic writing has witnessed significant advancements and widespread adoption of artificial intelligence (AI) tools and approaches across several application domains. AI-based tools for scientific writing are beneficial but also have some challenges. This scoping study aims to comprehensively examine the opportunities and challenges of AI in Education (AIEd) for Academic Writing by analyzing literature published over the last 8 years (2015-2023) from diverse national journal sites. The primary findings can be divided into two categories. First, the benefits of implementing AI in education for academic writing include improved writing skills and personalized feedback, writing assignment management, multilingual and multicultural support, collaboration and interactive support, and ease of access and inclusiveness. Second, the challenges in implementing AI in Education for academic writing include ethics and academic integrity, development of technical AIed skills, bias, personalized learning, roles and changes in education, evaluation and validity, and instructor understanding and utilization of AIed.

Keywords: Artificial Intelligence in Education, Academic Writing, Learning Technologies, Challenges, Opportunities.

1. Introduction

The utilization of artificial intelligence (AI) in educational settings, known as Artificial Intelligence in Education (AIEd), has become prevalent due to advancements in computing and information processing methods. The emergence of AIEd approximately thirty years ago has positioned AI as a potent instrument for enabling novel approaches to instructional design, technological advancement, and educational research that would otherwise be unattainable within conventional educational frameworks [1], [2]. Artificial Intelligence in Education (AIEd) has presented novel prospects, capacities, and obstacles for educational advancements. For instance, it has facilitated the transition towards individualized learning, posed challenges to the

traditional job of instructors, and contributed to the evolution of intricate educational systems [3], [4].

While there is considerable potential for artificial intelligence (AI) to revolutionize the field of education [1], it is important to note that achieving positive educational outcomes cannot be solely attributed to the utilization of modern AI computer technologies [5], [6]. A primary aim of artificial intelligence (AI) in the field of education is to offer tailored learning guidance or assistance to students on an individual basis, taking into account their unique learning status, preferences, and personal qualities [7]. The importance of incorporating the knowledge and intelligence of experienced teachers into the decision-making process of learning systems is a critical concern within the framework of precision education. This educational approach prioritizes the provision of prevention and intervention practices tailored to the specific needs of individual learners, achieved through the analysis of their learning status or behaviors (Hart, 2016).

The integration of artificial intelligence (AI) in the field of education has presented novel prospects for the creation of effective learning experiences and the advancement of technology-driven learning tools and settings. However, it remains a challenge for most researchers and practitioners from the field's education to implement relevant activities or systems [8]. According to Mitchell (2019), it is imperative that the design and development of forthcoming AI tools for students, teachers, and systems adhere to a human-centric approach and prioritize problem-solving. It is advisable to commence by providing a clear and concise characterization of the definition of challenges and opportunities AI in education. The utilization of AI tools for educational purposes should inherently aim to enhance the role of teachers rather than diminishing their professional standing or dignity. Developers must acknowledge that the pedagogical process is continuously evolving and inherently unpredictable. Merely adapting the learning content to suit an individual does not guarantee the utilization of the most efficient pedagogical approach or the facilitation of self-actualization for the student. Artificial intelligence (AI) has the potential to uncover previously undiscovered learning patterns within vast datasets, thereby offering valuable insights. However, AI lacks the ability to facilitate physical and social interactions among students and between students and teachers, as well as the capacity to fully convey the diverse range of human experiences.

Numerous research teams have undertaken multiple systematic evaluations to emphasize a recurring issue within the domain of Artificial Intelligence in Education (AIEd). This issue pertains to the dearth of scholarly research that addresses the various obstacles and potential benefits associated with the implementation of artificial intelligence in the field of education. Zawacki-Richter et al., (2019) undertook an extensive examination of 146 scientific works pertaining to the application of artificial intelligence (AI) within the realm of higher education. The results of their study indicated a lack of thorough analysis on the theoretical, pedagogical, and ethical implications that arise from the implementation of AI technologies in higher education

institutions. Deeva et al., (2021) did an extensive analysis of 109 scientific articles pertaining to automated feedback systems in their research. The researchers discovered that a majority of the publications examined in their study failed to address or analyze the various obstacles and opportunities associated with the implementation of artificial intelligence (AI) in educational settings, particularly within the context of academic writing. The exclusion of these theories and frameworks is of particular significance, as they play a crucial role in comprehending the implementation factors that impact the acceptance and utilization of these systems. To develop a thorough comprehension of the diverse obstacles and prospects associated with artificial intelligence (AI) technology in the field of education, it is crucial to conduct an analysis of these findings, with a specific focus on the efficient utilization of AI in education with the context of academic writing.

The utilization of artificial intelligence in education (AI) for the realm of academic writing can be categorized into two overarching groups: tools that aid authors throughout the writing process, and systems that are employed to appraise and gauge the caliber and soundness of written content. Tools such as natural language processing have the potential to aid authors in the composition and preparation of manuscripts by facilitating the comprehension and generation of language that closely resembles human speech [11]. One of the foremost advantages inherent in AI-based tools for academic writing is in their capacity to enhance efficiency and expedite the completion of tasks, hence resulting in time savings. According to [12] using AI for writing in the academic setting raises several moral dilemmas and concerns. On the one hand, the employment of AI can compromise the effectiveness of evaluations of student learning and devalue a diploma. As shown by [13] students may not learn the material well if they are not involved in the learning process and instead depend on AI to do all of the work for them. They may move forward with the following assignments unprepared. In addition, pupils may be able to plagiarize or cheat through AI without being caught. Hence, it is imperative to conduct additional review studies in order to use scoping review the existing literature, present a comprehensive assessment of the opportunities and challenges Artificial Intelligence in Education (AIEd).

2. Method

Design of Reviews. This article uses a scoping approach review to map review forms of Challenges and Opportunities the Use of Artificial Intelligence in education for academic writing. This study applies five stages of scoping review described by [2]Arskey and O'Malley (Arksey & O'Malley, 2005) . Scoping analysis. The review in this article also follows the rules written in the PRISMA Extension for Scoping Reviews (PRISMA - ScR): Checklist and explanation (Tricco et al., 2018) to ensure quality in reporting.
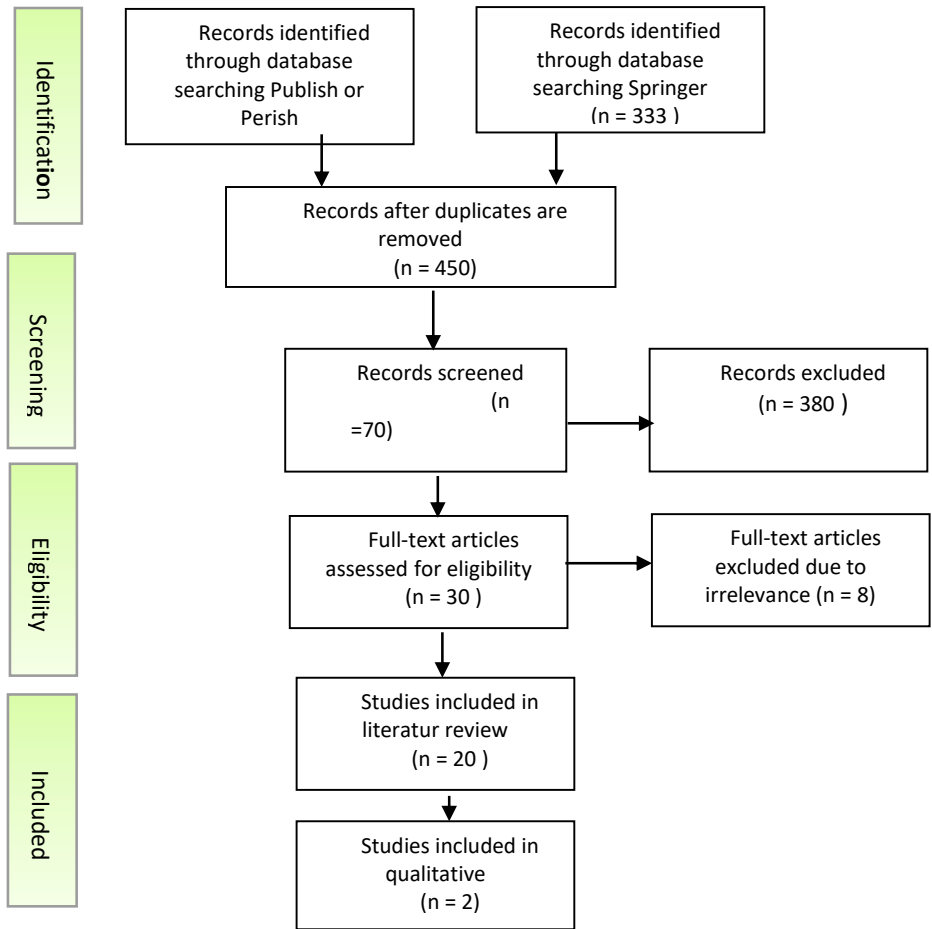
The criteria review is inclusion and exclusion in the following list: Inclusion Review Criteria is Research on Challenges and Opportunities Artificial Intelligence in education and article, and Published original research articles and literature reviews.

Second, Exclusion Review criteria. Exclusion criteria are factors that prevent the article from being used as a review. The criteria include several things, including: Do not use Challenges and Opportunities Artificial Intelligence in education in the following ways: The exclusion of non-English articles from the review was a result of the inability to translate them into English due to limitations in available resources, opinions, letters, and other works that are not original research, unpublished literature such as theses and working papers.

Search Method. The researchers searched the database and studied the scoping approach reviews. Article searching using scientific research is carried out through Springer and Publish and Perish 8 (harzing.com), The search was carried out using the keywords and operator bolean "Challenges" and "Opportunities" and "Artificial Intelligence in education" and "writing" reference lists searched to find more relevant articles.

Study Selection. The first search was carried out from an eight year article. From all searches, 450 articles were obtained from national journals. After analyzing various articles, 22 study articles that meet the requirements were included in this review.

Figure 1 Study Selection Process Flowchart

Charting Data

Table 1 Charting Data

	Author	Title	Challenge	Opportunity
1.	(Hwang et al., 2020)	Vision, challenges, roles and research issues of Artificial Intelligence in Education	Developing technical skills to simulate AI intelligence in writing	• improving academic writing skills, providing personalized feedback • to analyze large amounts of data and provide insights into writing patterns and trends, • offering of AI in automated writing assessment tools • offer personalized guidance, support, or feedback to students
2.	Zawacki-Richter et al., (2019)	Systematic review of research on artificial	• ethical implications • authorship and	-

	Author	Title	Challenge	Opportunity
		intelligence applications in higher education – where are the educators?	• publication ethics	
3	Niskanen et al., (2023)	Latest Trends in Artificial Intelligence Technology	• Labeled datasets creation for AI technologies is laborious • Processing and exploiting unstructured data from multiple sources is crucial in AI technology • The need for safety and explainable predictions before mass adoption of AI technologies in real-world applications.	• analysis and suggestions for improvement based on individual writing styles • offering translation services • generating topic ideas and guiding students
4	Kundi et al., (2022)	Artificial Intelligence and Bias	• Artificial intelligence (AI) has the potential to produce harmful results, such as inaccurate diagnoses. • Data input bias, algorithmic bias, and cognitive bias are just some examples of AI's biases that can spread or amplify preexisting biases. • Ethnic, gender, intersectional, health, and societal biases all have an impact on the input bias in AI.	• facilitate plagiarism detection • ensuring academic integrity • generate personalized writing prompts • help students with grammar and spelling checks, • analyze and evaluate the quality of text
5	Mishra (2023)	Enhancing Personalized Learning with Artificial Intelligence: Opportunities and Challenges	• Data Privacy and Security • Bias and Fairness • Lack of Access and Equity • Teacher Training • Cost and Infrastructure • Lack of Customization • Ethical Concerns • Overreliance on Technology • Assessment Validity • Data Quality • Acceptance and Resistance	• offer a wealth of academic resources • interactive courses, online drills, and virtual simulations, • providing an enriching and comprehensive learning experience.
6	Cotton et al., (2023)	Chatting and cheating: Ensuring academic integrity in the era of ChatGPT	• Possibility of Plagiarism • difficult to distinguish between a student's own writing and the	• creation of personalized assessments. • Interactive game-based assessment creation

	Author	Title	Challenge	Opportunity
			responses generated by	
8	Kamalov & Gurrib (2023)	A new era of artificial intelligence in education: a multifaceted revolution	● Data Privacy and Security ● Bias and Discrimination, ● Plagiarism and Academic Integrity	● Enhanced Learning Outcomes ● Time and Cost Efficiency, ● Global Access to Education
9	Ahmad et al., (2023)	Impact of artificial intelligence on human loss in decision making, laziness and safety in education	● Reliance on AI for content generation can lead to a loss of critical thinking skills and creativity in academic writing. ● Privacy and security concerns arise with the use of AI in education. ● Lack of personalized feedback and guidance. ● Ethical considerations in AI-generated content.	● Improved accessibility and inclusivity. AI-powered tools can assist students with disabilities by providing real-time transcription, language translation, and other accommodations .
10	Kasneci et al., (2023)	ChatGPT for good? On opportunities and challenges of large language models for education	● Teacher and student competence and literacy ● misuse of AI technology ● potential bias in human supervision	● Help pupils build research skills by giving information and resources. ● Assists students in collaborative writing by offering style and editing comments, among other things. ● Assist with programming, report writing, project management, decision-making, and problem-solving. ● Assist university and high school teachers with research and writing (e.g., seminars, papers, student comments) more efficiently.
11	Akgun & Greenhow (2022)	Artificial intelligence in education: Addressing ethical challenges in K-12 settings	● Ethical challenges, ● Bias can be inherent in AI algorithms, ● Educators may have different ethical concerns ● crucial for teachers and students to understand the limits, potential risks, and ethical drawbacks of AI	● suggest alternative word choices, sentence structures ● assessing and grading written assignments, provide language translation services ● enabling students to access writing resources and materials in different languages, promoting multilingualism and

	Author	Title	Challenge	Opportunity
				understanding
12	Humble & Mozelius (2022)	Artificial Intelligence in Education - a Promise, a Threat or a Hype?	• educe human interaction,job displacement for teachers, Inequality and accessibility, infallible and may make errors or provide inaccurate information, Dependence on technology	• Intelligent tutoring, • Automated grading, • Data analysis
13	Celik et al. (2022)	The Promises and Challenges of Artificial Intelligence for Teachers: a Systematic Review of Research	• implementing AI tools effectively • understanding and utilizing the technology to its full potential • Ethical concerns • trusting the reliability and accuracy of AI systems	• Plagiarism detection • Offering suggestions for grammar, vocabulary, and sentence structure • Analyze students' writing patterns and provide insights to teachers • Support teachers in providing individualized instruction by analyzing students' writing strengths and weaknesses and offering personalized writing tasks
14	Singh et al., (2021)	Learning With Artificial Intelligence Systems: Application, Challenges, and Opportunities	• Lack of human creativity • Limited understanding of contex • Ethical concerns • Adaptability to individual needs • Integration and accessibility • Subjectivity in writing assessment	• Support collaborative writing projects by facilitating real-time editing • Automate tasks grammar and spell checking • Allowing students to focus on content creation.
15	Essien et al., (2021)	Opportunities and Challenges of Adopting Artificial Intelligence for Learning and Teaching in Higher Education	• Ethical considerations • Lack of human interaction • Equity and accessibility • Changing roles of educators • Unpredictability and limitations	• Language translation and support • Writing assistance and prompts • Plagiarism , Grammar and style suggestions • Automated feedback and grading
16	Verma et al., (2021)	Study of AI Techniques in Quality Educations: Challenges and Recent Progress	• not always provide comprehensive feedback or guidance on improving writing skills • inherent biases that can impact the evaluation of students'	• facilitate language translation and grammar correction • personalized writing instruction • plagiarism detection by comparing students' writing with

		Author	Title	Challenge	Opportunity
				work, potentially disadvantaging certain groups • may focus more on surface-level errors rather than deeper aspects of writing, •	a vast database of existing texts
17		Ng et al.(2023)	A Review of Artificial Intelligence (AI) in Education from 2010 to 2020	• job security and the potential replacement of teachers • Social and ethical issues • Changing roles of teachers and students	• provide automated feedback, assessment of writing assignments, personalized writing instruction, provide language support, stimulating creativity and critical thinking skills
18		Holmes (2022)	Ethics of AI in Education: Towards a Community-Wide Framework	• May inadvertently perpetuate biases in writing assessments • Provide tailored feedback • Careful consideration of ethical and privacy concerns	• Provide language support for non-native english speakers • Provide language support for non-native english speakers • Assist students in brainstorming, organizing ideas • Managing large volumes of student writing assignments
19		Floridi & Chiriatti (2020)	GPT-3: Its Nature, Scope, Limits, and Consequences	• Job Displacement in Writing Industry • Unrealistic Expectations from AI Writing Models • Limitations of AI Language Models in Professional Writing • Consequences of AI on the Writing Profession • risk of AI providing misinformation	• Assist students in grammar and spelling correction, sentence structure improvement, and vocabulary enhancement • Automated essay grading systems, enabling faster and more consistent evaluation of student writing • Providing language translation, language modeling, and language practice exercise
20		Ilkka (2018)	The Impact of Artificial Intelligence on Learning, Teaching, and Education	• Accurate assessment and feedback in AI Writing Education • Nuances of language in AI writing education • Bias in AI writing assessment	• Analysis of structure and coherence in writing • Personalized feedback for individual writing needs • Development of critical thinking and analytical skills

	Author	Title	Challenge	Opportunity
			- Assessing creativity and originality in AI writing - Adaptability and evolution of AI writing systems	- Access to writing Resources through AI - Time-saving in Grading and Feedback with AI
21	Sottilare et al., (2018)	Creating a Stable and Flexible Platform for Innovations in AIED Research	- Generalizing authoring - Understanding team dynamics - Adapting to individual learner needs - Integrating affect-aware feedback - Designing adaptive tutoring systems	- Support language learning by providing writing exercises and interactive activities - plagiarism detection - Writing assistance - provide personalized and adaptive instruction to students in the area of writing, - Automated grading
22	Pinkwart (2016)	Another 25 Years of AIED? Challenges and Opportunities for Intelligent Educational Technologies of the Future	- veloping precise and dependable automated essay grading. - Ensuring cultural sensitivity and inclusivity in AI - Privacy and data security concerns occur with AI systems that demand access to personal data and writing samples. - Balancing automated feedback with human interaction to sustain the function of teachers - Ensuring the effectiveness and validity of AI-based writing teaching demands comprehensive study and evaluation	- access to vast repositories of resources and information - facilitate collaborative writing experiences - Intelligent tutoring systems can provide personalized feedback - an assist students in learning to read and write by providing real-time feedback on pronunciation and language skills

3. Results

3.1 Opportunities in implementing Artificial Intelligence in Education for Academic Writing

The opportunity aspects can be grouped into categories that reflect the potential positive contribution of AI in improving the academic writing experience. The following is a tabular interpretation in paragraph form that divides the opportunities into several categorical aspects:

Improved Writing Skills and Personalized Feedback. Several studies, such as Hwang et al. [33] and Verma et al. [26], highlighted the opportunity for AI to improve students' writing skills by providing personalized feedback. AI can analyze individual writing patterns, provide improvement suggestions, and provide specific student needs guidance. This can help students develop their writing skills more effectively. AI can analyze students' writing patterns. By collecting and analyzing data from students' writing, AI can identify strengths and weaknesses in their writing. This

includes sentence structure, vocabulary usage, and grammatical errors [21], [23], [24]. This analysis opens the door for AI to provide more focused and specific feedback

Furthermore, AI can provide personalized improvement suggestions. Through algorithms that can understand students' individual needs, AI can generate improvement recommendations that suit each piece of writing. For example, AI can highlight inappropriate word usage, provide alternative words or phrases, and identify areas where students can improve their essays or papers. Furthermore, AI can provide customized guidance according to the student's needs. This includes providing direction for idea development, improving writing organization, and strengthening arguments. Thus, AI not only provides corrections but also serves as a virtual mentor who provides learning directions tailored to each student's skill level and unique needs. This utilization of AI in providing personalized feedback can help students develop writing skills more effectively [27], [29], [30], [32]. With a more targeted focus and specific recommendations, students can see progress in certain aspects of their writing skills. In addition, this personalized approach creates an adaptive learning environment where each student can be provided with level-appropriate support.

Writing Assignment Management. Several studies, including Singh et al [24] and Pinkwart [32] highlight the opportunities of AI in managing large volumes of student writing assignments. AI can greatly contribute to improving efficiency in the management of writing assignments. Using an automated scoring system, AI can evaluate students' written work quickly and objectively. Intelligent algorithms can automatically provide scores or feedback on certain aspects, such as sentence structure, clarity of ideas, and language usage. This reduces teachers' workload in conducting manual assessments, allowing them to focus on aspects that require more in-depth assessment.

Furthermore, using text analysis tools by AI can provide deeper insights into students' written work quality. AI can analyze aspects such as word choice accuracy, argument continuity, and expression clarity. This analysis can provide students with more detailed and specific feedback, helping them understand the strengths and weaknesses in their writing. Thus, AI speeds up the assessment process and improves the quality of feedback given to students.

Multilingual and Multicultural Support: Several studies, such as Akgun & Greenhow [21] and Holmes [28] emphasize AI's ability to support multilingualism. AI can provide language translation [31], offer alternative words and sentence structures in different languages [26], and promote cultural understanding through easy access to writing resources in multiple languages. AI can provide language translation. Through automatic translation technology, AI can help students who speak different languages to access and understand teaching materials in their language. This creates an inclusive learning environment and ensures that students with multilingual backgrounds can better follow the lessons. Then AI can offer alternative words and sentence structures in different languages. This helps students enrich their vocabulary and allows them to convey their thoughts and ideas in a way that conforms to the grammatical rules in the language used. This creates room for the development of multilingual communication skills.

Collaboration and Interactive Support: Research results from Kasneci et al. [20] and Sottilare et al. [31] highlighted the role of AI in stimulating collaboration and active interaction among students, pinkwart [32] highlighted that AI can facilitate co-authoring experiences. AI can enhance collaboration among students through automated assessment. By deploying intelligent algorithms, AI systems can evaluate individual contributions to collaborative writing projects, providing timely and objective feedback. This automated assessment relieves educators of some grading responsibilities and encourages students to participate in the collaborative writing process, fostering teamwork actively; AI can contribute to creating interactive writing experiences. AI tools can engage with students during the writing process by acting as a virtual writing assistant. These tools may offer real-time suggestions for improving grammar, sentence structure, and writing style.

Furthermore, they can guide students through brainstorming sessions and provide feedback on the coherence and clarity of their writing. This interactive support enhances the learning experience, making academic writing more dynamic and responsive to individual needs.

Pinkwart's [32] emphasis on AI facilitating co-authoring experiences aligns with the idea that AI can assist students in working collaboratively on written projects. AI tools can aid in coordinating efforts, providing real-time editing suggestions, and managing the collaborative writing workflow. This collaborative aspect prepares students for teamwork and introduces them to tools and practices commonly used in professional writing environments.

Ease of Access and Inclusiveness: Several studies, including Ahmad et al. [19] and Kamalov & Gurrib [18], highlight the potential of AI to improve accessibility and inclusiveness in education. AI can provide real-time assistance to students and search for other sources of accommodation information, thus increasing the participation and engagement of diverse students. Can provide real-time assistance to students. Through various applications and tools, AI can provide immediate support in understanding the subject matter, answering questions, or providing additional explanations. This provides particular benefits for students with specific learning needs or challenges, who can receive immediate guidance and assistance.

Furthermore, AI can assist students in finding sources of information or references. With advanced search algorithms, AI can guide students in finding materials relevant to the studied topic. This helps students to access information more efficiently, regardless of their skill level or background. AI can provide other accommodations to support inclusivity. Examples include display or voice adjustments on digital learning platforms for students with different accessibility needs. This creates a learning environment that is welcoming and accessible to all students, regardless of differences in needs or abilities. Thus, applying AI in education and academic writing brings many opportunities, from improving writing skills to increasing inclusivity and supporting student collaboration. This reflects the positive potential of AI in designing educational experiences that are more dynamic, adaptive and responsive.

3.2 Challenges in Implementing Artificial Intelligence in Education for Academic Writing

In an era where technology is advancing rapidly, integrating Artificial Intelligence (AI) in education has become an increasingly prominent topic among academics and practitioners. The application of AI technology in the educational context holds the promise of various improvements, ranging from personalized learning to administrative efficiency. However, akin to other technological innovations, the use of AI in education faces several challenges that require careful understanding and precise solutions. These challenges involve critical aspects such as data privacy, algorithmic bias, resistance to technology, and profound ethical questions.

Scientific inquiry into AI's role in education is becoming progressively more crucial to identify, comprehend, and formulate strategies to address these hurdles. In the academic writing context of higher education, discussions regarding the challenges of AI in education necessitate a strong theoretical foundation and a deep understanding of the educational and artificial intelligence contexts. By understanding these issues, researchers and academicians can provide valuable insights for developing policies, best practices, and improved technological solutions.

In this manuscript, we will explore some significant findings revealed by recent research regarding the challenges of AI in education. These findings include algorithmic bias, data privacy, and the social impact of implementing AI technology in the learning context. Through an exploration of these findings, a more comprehensive understanding of the complexity and relevance of AI

challenges in optimizing the learning experience in higher education institutions will be attained. The elucidation of these findings is as follows.

Ethics and Academic Integrity. Zawacki-Richter et al. [9] discuss ethical challenges related to the use of AI in higher education, including ethical implications, ownership, and publication ethics. These findings align with Cotton et al.'s [17] research, emphasizing the potential for plagiarism and difficulty distinguishing between student writing and responses generated by ChatGPT. Niskanen et al. [14] highlight the need for safety and explainable predictions before adopting AI in real-world applications. This aligns with Holmes's [1] findings, emphasizing the need for ethical considerations and privacy when implementing AI to assess writing. This reflects the need for AI systems that can provide accurate predictions and explain the reasoning behind these predictions.

Development of Technical AIED Skills. This challenge emerges from the research conducted by Hwang et al [33]. They emphasize the need to develop technical skills in simulating artificial intelligence in writing. This corresponds with Mishra's [16] findings, which indicate that an overreliance on technology can hinder learning. Hwang et al, Humble & Mozelius, and Celik et al. [2], [22], [23] discuss expectations and constraints in the use of artificial intelligence in the educational context. Hwang et al. note expectations regarding the role of AI in enhancing the learning process but also highlight challenges in developing technical skills to simulate artificial intelligence in writing. Humble & Mozelius reflect expectations and constraints regarding the use of AI, such as the potential replacement of teachers' jobs, unequal access, and dependence on technology. Celik et al. highlight expectations for the effective implementation of AI tools for teachers while addressing challenges such as ethical concerns and trust in the reliability of AI systems.

Bias in AI. Findings presented by Kundi et al[15] regarding the potential bias in artificial intelligence (AI) are a significant concern in developing and applying this technology in education. Their analysis highlights three critical aspects of bias: bias in input data, bias in algorithms, and cognitive bias. First, bias in input data indicates that the data used to train AI models may need to be more representative overall, leading to inaccurate or harmful outcomes. This aligns with research by Singh et al. [24] and Akgun & Greenhow [21], who also emphasize the ethical concerns and the presence of inherent bias in AI algorithms.

Research by Kundi et al. [15] reveals that artificial intelligence (AI) can exhibit biases leading to unfair or discriminatory outcomes. They highlight three main sources of bias: First, the data used to train AI may reflect societal inequalities, enabling the model to learn and reproduce such inequalities. Second, AI algorithms can possess biases, and if not carefully managed, they can reinforce and propagate existing biases, creating a difficult-to-break cycle. The importance of caution and strict monitoring of data sources is emphasized, along with clarity in how algorithms make decisions. This implies that developers and users of AI in education need to understand the origins of data and ensure that the algorithm's decision-making process can be well-explained. The research findings also highlight "cognitive bias," the possibility that AI can present information with distortion, similar to how humans perceive something subjectively. This underscores the complexity of developing AI that is truly fair and free from bias. Therefore, this research provides a deep understanding of significant challenges that must be addressed to ensure the ethical use of AI in education. The alignment of these findings with other studies by Singh et al. [24] and Akgun & Greenhow [21] emphasizes that bias in AI is a serious global issue that requires further attention. Comprehensive improvements in bias-handling approaches will be necessary for this technology's fair and responsible implementation in the educational context.

Personalized Learning. Mishra [16] presents various challenges in enhancing personalized learning using AI, including data privacy, bias, accessibility, and resistance to technology. Firstly, data privacy concerns become a primary focus, where the use of AI technology for personalized learning

may involve collecting and processing students' personal data. The importance of protecting individual privacy while leveraging the benefits of technology becomes an aspect that needs careful balancing. Furthermore, there are challenges related to bias in AI systems. As found by Mishra, there is concern that personalized learning can introduce biases, both in understanding students' abilities and in providing learning recommendations. This requires careful algorithm design and special attention to prevent the reproduction or reinforcement of inequalities.

In addition, accessibility becomes a crucial factor. AI-driven personalized learning should be accessible to all students regardless of their background or special needs. In this regard, creating inclusive solutions that empower all students poses a challenge that needs to be addressed. Resistance to technology is also a consideration. Some individuals may feel uncomfortable or reject learning heavily dependent on AI technology. Therefore, it is important to understand and address this resistance through communicative and educational approaches. Similar findings by Ahmad et al. [19] highlighting concerns about the loss of critical thinking skills due to dependence on AI, emphasize the complexity of implementing personalized solutions. These challenges demand deep ethical and practical considerations to ensure that the implementation of AI-driven personalized learning brings benefits while maintaining the overall integrity of education and the development of student's skills.

Roles and Changes in Education. Findings such as those revealed by Ahmad et al, Essien et al., and Sottilare et al. [19], [25], [31] underscore the roles and changes occurring in education as a result of the presence of artificial intelligence. Ahmad et al. indicate students' potential loss of critical thinking and creativity skills due to reliance on AI for content generation. Essien et al. highlight changes in the role of educators, emphasizing shifts in the roles of teachers and students, as well as constraints such as a lack of human interaction and uncertainty in AI implementation. Sottilare et al. discuss changes in how the material is taught, such as personalized delivery to individual needs and feedback integration that considers students' emotional aspects.

Evaluation and Validity of AIED in Education. Verma et al. [26] and Pinkwart [32] highlight aspects of evaluation and validity in using artificial intelligence in education. they emphasize that AI only sometimes provides comprehensive feedback or guidance to improve writing skills. Then underscores the need for accurate and reliable evaluation, especially in automated essay assessments, and the challenge of balancing automated feedback and human interaction to maintain the teacher's function.

Understanding and Utilization of AIED by Instructors. Kasneci et al [20] and Singh et al [24] discuss the understanding and utilization of artificial intelligence by instructors. Kasneci et al. [20] highlight the importance of teachers' and students' competency in artificial intelligence literacy. Singh et al. [24] emphasize that a lack of understanding of human context and limitations of human creativity can be challenges in adopting AI in education. This indicates that a better understanding of technology and its effective utilization can help overcome some challenges in using artificial intelligence in education.

4. Discussion

The integration of Artificial Intelligence (AI) in education holds transformative potential for academic writing, presenting diverse opportunities while also necessitating the thoughtful consideration of challenges. Exploring these challenges and opportunities is fundamental to comprehending the potential impact and implications of AI in shaping the future of academic writing education.

A key advantage of incorporating AI into academic writing lies in its capacity to facilitate personalized learning experiences. AI technologies can analyze individual student data, offering targeted feedback and customized learning resources. This personalized approach acts as a catalyst for significantly enhancing the learning process, allowing students to develop writing skills more effectively. Furthermore, the introduction of AI into academic writing environments fosters the development of crucial soft skills, providing opportunities for critical thinking, problem-solving, and creativity. Interacting with AI technology enables students to cultivate skills in analyzing, synthesizing, and evaluating information—skills essential for success in academia and beyond.

One of the notable opportunities that AI brings to academic writing is the streamlining of manuscript preparation efforts. AI-based tools allow researchers to automate tasks such as formatting, referencing, and proofreading, thereby enabling a more concentrated focus on content and analysis. As noted by [34], AI-powered automated feedback tools contribute to students' feedback literacy, offering instant and personalized feedback to enhance writing skills and elevate the quality of their work. The advancement of AI technology in education presents exciting prospects for personalized learning, as highlighted by [35]. AI's potential extends to providing predictive models, identifying high-performing and at-risk students, tracking academic progress, and designing individualized lesson plans and feedback. AI algorithms play a crucial role in improving learning outcomes by tailoring instruction to each student's unique needs and learning style. Moreover, the integration of AI technologies in education facilitates personalized learning experiences by employing algorithms to analyze student data and offer tailored recommendations and feedback. This approach empowers students to progress at their own pace, accommodating individual needs and learning styles. In essence, the thoughtful integration of AI in academic writing education not only addresses challenges but also opens up a realm of opportunities for enriching and personalizing the learning experience for students.

Beyond opportunities, the implementation of AI in education poses challenges that must be carefully considered by education practitioners and policymakers. This encompasses the need to create a comprehensive public policy on AI aligned with sustainable development and ethical pedagogical choices, respecting fundamental human principles, legal frameworks, and principles of inclusion and equity in education. [28], [36], [37]. Implementing AI in education also requires designing pedagogical concepts that align with epistemology and ethics, truth and the good, individual and collective responsibility [38]. In addition to pedagogical concepts, implementing AI in education must prepare educators to adapt to AI development and support the creation of ideal pedagogical concepts and integrated AI. Technical learning systems, frameworks, models, approaches, combinations of interventions, and implementation guidelines are the next challenge for education practitioners and policymakers [39]

In order to achieve the ideal education revolution using artificial intelligence (AI), it is imperative for educators, policy-makers, and professionals to collaborate effectively [40]. One important aspect to address pertains to the development of strategies for integrating artificial intelligence (AI) into students' daily routines in a manner that aligns with their cultural backgrounds, aspirations, and educational objectives [41]. Finally, curriculum design must also be adjusted to the development and features of AI that support the achievement of curriculum goals. The prioritization of AI literacy aims in students must be a key focus in the design of this program [42]. The right design of literacy instruction is crucial as it serves as the fundamental basis for students to acquire and excel in diverse competencies within their respective disciplines.

In the context of academic writing education, the scoping review conducts a thorough examination of the intricate dynamics associated with the infusion of artificial intelligence. This examination emphasizes the necessity of a comprehensive understanding of the challenges to effective AI implementation, along with a recognition of the profound potential of AI to transform academic writing instruction. By synthesizing diverse viewpoints, the scoping review lays the groundwork for

subsequent research and informed decision-making within the dynamic realm of AI-enhanced education.

5. Conclusion

In conclusion, this comprehensive scoping analysis examines the complexities associated with the integration of Artificial Intelligence (AI) into educational processes, with a specific emphasis on its utilization in the context of academic writing. The research methodology employed a review exploration, encompassing various strategies to assess the challenges and opportunities associated with the incorporation of AI in the realm of academic writing education. The results of the study emphasize the complex nature of artificial intelligence (AI) in the field of education, emphasizing the presence of both obstacles and potential opportunities. The utilization of artificial intelligence (AI) tools offers a wide range of possibilities for improving the academic writing abilities of students. These may encompass automated feedback systems, writing assistance driven by artificial intelligence, and novel methodologies in instructional design. Nonetheless, several obstacles were recognized as substantial barriers to the effective integration of AI in academic writing education, including ethical problems, privacy concerns, and the necessity for comprehensive teacher training.

Furthermore, the study highlights the need of taking into account limitations in resources and the utilization of adaptive technology when choosing suitable types of artificial intelligence tools for academic writing. In a manner akin to the aforementioned illustration, wherein the choice of digital storytelling modalities necessitated the evaluation of available resources and adaptability, the incorporation of artificial intelligence (AI) tools within the realm of education must be in accordance with pragmatic factors. In light of the ongoing evolution of the educational landscape driven by technology breakthroughs, this study establishes a fundamental basis for future research endeavors. Suggested avenues for future investigation encompass comprehensive qualitative inquiries aimed at comprehending user experiences, the practical application of artificial intelligence (AI) tools in authentic educational environments to assess efficacy, and interdisciplinary partnerships to tackle ethical and privacy considerations. In conclusion, this scoping review provides significant contributions to the knowledge base for educators, policymakers, and researchers who seek to effectively address the difficulties and capitalize on the advantages associated with artificial intelligence in the field of academic writing instruction.

6. Statement and Declarations

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