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Review

Generative AI, Research Ethics, and Higher Education Research: Insights from a Scientometric Analysis

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Abstract: In the digital age, the intersection of artificial intelligence (AI) and higher education (HE) poses novel ethical considerations, necessitating a comprehensive exploration of this multifaceted relationship. This study aims to quantify and characterize the current research trends and critically assess the discourse on ethical AI applications within HE. Employing a mixed-methods design, we integrated quantitative data from the Web of Science, Scopus, and the Lens databases with qualitative insights from selected studies to perform scientometric and content analyses, yielding a nuanced landscape of AI utilization in HE. Our results identified vital research areas through citation bursts, keyword co-occurrence, and thematic clusters. We provided a conceptual model for ethical AI integration in HE, encapsulating dichotomous perspectives on AI's role in education. Three thematic clusters were identified: ethical frameworks and policy development, academic integrity and content creation, and student interaction with AI. The study concludes that, while AI offers substantial benefits for educational advancement, it also brings challenges that necessitate vigilant governance to uphold academic integrity and ethical standards. The implications extend to policymakers, educators, and AI developers, highlighting the need for ethical guidelines, AI literacy, and human-centered AI tools.

Keywords: artificial intelligence; higher education; ethical implications; large language models; academic order

Citation: Qadhi, S.M.; Alduais, A.; Chaaban, Y.; Khraisheh, M. Generative AI, Research Ethics, and Higher Education Research: Insights from a Scientometric Analysis. *Information* **2024**, *15*, 325. https://doi.org/10.3390/info15060325

Academic Editor: Robin Haunschild

Received: 5 May 2024
Revised: 21 May 2024
Accepted: 23 May 2024
Published: 2 June 2024

1. Introduction

Academic research is underpinned by principles of integrity and ethics, which are fundamental to advancing knowledge and preserving scholarly trust. The exploration of these principles in the context of AI within HE forms the core of our investigation. Building on the thematic reviews by [1], which articulate the symbiotic relationship between research integrity and adequate supervision, this study extends the discourse to the domain of AI, where ethical supervision becomes ever more critical in the face of emerging technologies. In a subsequent study, Muthanna and Alduais explored the nuanced interplay of reflexivity, sensitivity, and integrity in conducting interviews, categorizing sensitivity levels to enhance ethical interview practices and, by extension, research trustworthiness [2]. Building on these insights, Muthanna, Chaaban, and Qadhi proposed a model elucidating the interrelationship between research ethics and integrity, highlighting novel forms of research misconduct and strategies for their mitigation [3]. Thus, in this study, we seek to provide quantitative and qualitative syntheses of AI applications in HE, addressing the balance between its transformative potential and its ethical challenges, such as concerns over academic integrity and the need for human oversight in AI-driven content creation.

1.1. Ensuring the Ethical Use of Large Language Models in Scholarly Writing

Previous literature proposes that researchers can ensure the ethical use of large language models (LLMs) in scholarly writing by disclosing their use, discussing potential ethical issues, addressing challenges like privacy and data biases, following guidelines and applications for ethical protocols, designing and regulating for safety and reliability, and updating ethical frameworks while incorporating human expertise for evaluation [4–8].

In fact, the arrival of LLMs, such as OpenAI's ChatGPT, has necessitated a paradigm shift in academic research and writing [9–11]. Their academic applications range from drafting research papers to generating literature reviews, offering a powerful tool for researchers seeking to augment their writing process and explore complex ideas [12,13]. However, as with any revolutionary technology, adopting such models raises some questions about their ethical use, particularly in academic integrity and the authenticity of scholarly work [14].

The scholarly community's reaction to the advent of these text generation tools has been a mixture of enthusiasm and anxiety [15,16]. While many researchers have embraced the potential of LLMs to enhance the research and writing process, others have voiced concerns regarding ethical dilemmas, such as authorship attribution, potential plagiarism, and the authenticity of content generated by AI [17,18]. These concerns underscore a broader ethical debate about the role and impact of AI in academic research, emphasizing the need to examine how these tools are integrated into scholarly practices carefully [19,20]. The varying reactions highlight a fundamental question: how can the academic community ensure the ethical use of LLMs in a way that enhances research integrity and the advancement of knowledge?

In response to these concerns, there has been a prolific emergence of several ethical guidelines aimed at regulating the use of AI in scholarly writing [21–23]. These guidelines range from recommendations on disclosing the use of AI in research outputs to addressing challenges like data privacy, biases inherent in AI models, and ensuring the reliability and safety of generated content [24]. Academic institutions, research bodies, and publishers are increasingly recognizing the importance of these guidelines, which serve not only as a framework for ethical AI use but also as a catalyst for ongoing discussions about the evolving relationship between AI and academic integrity [16,21,25]. There is an assumption among the scholarly community that the development and adoption of these ethical guidelines represent a critical step towards fostering responsible AI use in academic writing, ensuring that advancements in AI technology contribute positively to knowledge production [26].

1.2. Ethical Issues Regarding Using Large Language Models to Write Research Papers

The existing literature suggests that using large language models for writing research papers raises ethical issues, including technological readiness, privacy, equality, the potential for discrimination and misinformation, intellectual property rights violations, and labor injustices, and the need for updated ethical frameworks to address these concerns [6,27,28].

One of the critical concerns about the usage of LLMs is the level of their technological readiness. Yan et al. speculate that the current LLMs may not adequately manage the complexity of academic writing [6]. Problems with factual correctness, logical coherence, and sophisticated argumentation can undermine research integrity and lead to misleading or erroneous material. Since the reasoning behind deep learning models' findings is often hidden, their "black box" nature frequently makes it difficult to assess the reliability and quality of the data they supply. This lack of transparency may lead researchers to unintentionally depend on biased or inaccurate data produced by the models due to bias and trust issues. This concern is further amplified by the potential for LLMs to generate misinformation through misinterpretation of data or deliberate manipulation [29]. According to Chang et al., current LLMs cannot consistently oversee the intricacies of academic writing due to their lack of sophistication [30]. Problems with factual accuracy, logical coherence, and complex argumentation might jeopardize research integrity and lead to misleading or erroneous content.

Furthermore, privacy and intellectual property rights issues are raised by LLMs' reliance on large datasets for training. Weidinger et al. have drawn attention to the possibility that these datasets include private or copyrighted information, the use of which may be ethically questionable and legally unclear [31]. It can be challenging to decide who should be given credit for writing when LLMs are used to generate text—the researcher who inspired the model or the model itself. Due to this ambiguity, attribution of credit and accountability for the study output may become contentious or difficult [28,32]. If an LLM significantly adds to the study's substance, should it be listed as an author of the research paper? How can the LLM and the human researcher's contributions be reasonably recognized? These questions require careful consideration and the development of new ethical guidelines. Another primary concern is the potential for LLMs to create misinformation and discrimination. LLMs trained on biased datasets have the potential to propagate biased language and harmful beliefs [27]. The manipulation of LLMs to generate fraudulent research papers or change the public's opinion of scientific matters is called into doubt by this.

Finally, the use of LLMs in research necessitates the development of new ethical frameworks [33]. It is probable that the specific challenges posed by LLMs, such as the potential for data manipulation, authorship doubt, and plagiarism, are not adequately addressed by the rules now in place regarding research ethics. New frameworks need to be developed to ensure the moral and proper application of LLMs in research while promoting justice, accountability, and transparency.

1.3. Existing Ethical Guidelines for Using Large Language Models in Scholarly Writing

LLMs offer the potential to improve research productivity and foster innovation; however, they require revised ethical standards to tackle challenges that include the disclosure of their utilization, citation protocols, privacy concerns, intellectual property considerations, and the deterrence of plagiarism and fraudulent activities [22,26,34]. McGuire argues for a redefinition of plagiarism and co-authorship [35]. Meanwhile, Parker, Richard, and Becker emphasize the need for comprehensive guidelines that address the ethical use of LLMs in research processes, including developing and refining interview protocols [36]. Further, Piller (2023) further explores the ethics of nondisclosure in co-writing with LLMs in professional contexts, highlighting the importance of transparency, data practices, and the consideration of risk imposition [37]. Additionally, Varma points out the potential of LLMs as assistive technology for bioethics scholars, particularly those who are disabled or neurodivergent, underscoring the need to explore further the inclusivity aspects of LLM use in academia [38]. A crucial concern highlighted by Porsdam Mann et al. revolves around the ethical opportunities and challenges of personalized academic prose and idea generation using LLMs [32]. Their exploration into AI Unique Tailored Output Generators (AUTOGENs) models reveals the nuanced ethical landscape of enhancing academic writing with LLMs, touching upon issues such as privacy, intellectual property, and preventing plagiarism or fraud [32]. Echoing these concerns, Resnik and Hosseini discuss the integrity of scholarly writing amidst the use of fine-tuned LLMs like AUTOGEN, highlighting the potential for such technologies to influence the quality and originality of academic work adversely [39].

1.4. Purpose of the Present Study

Our review of recent reviews on the use of LLMs like ChatGPT in writing research papers demonstrated that this issue has sparked significant ethical concerns across various domains, including bias, plagiarism, transparency, and data privacy, necessitating a thorough understanding of responsible innovation and application in scientific research. LLMs can perpetuate stereotypes and unfair discrimination due to biases in their training data [40–42]. They also pose risks of plagiarism and copyright infringement when generating text that closely mimics existing works without proper attribution [43,44]. Additionally, LLMs often lack transparency in their decision-making processes, which hinders

reproducibility and accountability in research [41–43]. The use of LLMs raises data privacy concerns, especially when sensitive information is inadvertently included in the generated content [40,42,44]. The originality of content produced by LLMs is questionable, prompting debates about whether LLMs should be credited as authors in scientific papers [43,44]. Moreover, LLMs can produce incorrect or misleading information, which is particularly harmful in scientific research, where accuracy is paramount [40,44]. Legal and ethical challenges also arise in ensuring the responsible use of LLMs, highlighting the need for clear guidelines and regulations [40,42,43]. Addressing these multifaceted ethical issues requires collaborative efforts to establish clear guidelines and ethical standards to ensure the responsible use of LLMs in scientific research.

Dissimilarly to the previous review, our present review explores the multifaceted relationship between AI and HE, with a particular focus on the ethical implications of AI's integration into academic practices. The study aims to achieve the following two primary objectives: first, to conduct a scientometric and content analysis that quantifies and characterizes the research trends, patterns, and central themes related to the use of AI in HE, and second, to critically assess the discourse surrounding the responsible and ethical application of AI technologies in educational settings. By examining citation bursts, keyword co-occurrence, and thematic clusters, the study seeks to provide a comprehensive overview of the current state of AI in HE and its trajectory within the scholarly landscape, intending to identify strategies that promote ethical practices and responsible AI usage.

The scope of the study encompasses a broad range of academic literature, utilizing a mixed-methods design that combines quantitative data from comprehensive databases with qualitative insights from the most relevant and recent studies. The rationale behind this approach is to capture a holistic view of the ethical considerations emerging in the context of AI's rapid development and its growing presence in HE. This includes investigating the balance between AI's potential to transform educational paradigms and the ethical challenges it introduces, such as concerns over academic integrity, the need for human oversight, and the management of AI-driven content creation. By delineating the contours of ethical AI integration and proposing a conceptual model for its implementation, the study addresses a pressing need for structured guidance in navigating the complex intersection of AI technology and educational ethics.

The study uniquely contributes to the existing body of research by quantitatively and qualitatively synthesizing current trends in AI applications within HE, specifically focusing on ethical implications. It identifies key research areas through citation bursts, keyword co-occurrence, and thematic clusters, and proposes a novel conceptual model for ethical AI integration in HE. This model encapsulates dichotomous perspectives on AI's role in education, addressing both its transformative potential and ethical challenges. The study also emphasizes the necessity for vigilant governance, ethical guidelines, AI literacy, and human-centered AI tools, thereby providing a comprehensive framework that merges quantitative data with qualitative insights to navigate the ethical landscape of AI in HE.

2. Methods

2.1. Sampling

The quantitative component of our study encompassed a comprehensive dataset comprising 608 records from Web of Science, 1199 from Scopus, and a substantial 20,244 from the Lens database. Further refinement was conducted to distill the most pertinent studies across these databases, yielding eighty-nine unique entries post-duplication removal. Qualitatively, we homed in on twenty-four critically relevant and recent studies, which were meticulously selected from this refined pool. Search strings are shown in Table 1. Since this was a scientometric review, the selection of the included studies is totally based on the input search strings mentioned in Table 1. We included all returned results and excluded conference abstracts, reviews of books, editorials, and letters, as these do not include analyzed data.

Table 1. Used search strings in the Web of Science, Scopus, and Lens.

Query No. and Database	Search String
12	"artificial intelligence" or "large language model*" or "chatGPT" or "GPT" or "AI" (Title) and "plagiarism" or "fake research" or "fake research paper" or "research misconduct" (Title)
11	"artificial intelligence" or "large language model*" or "chatGPT" or "GPT" or "AI" (Title) and "qualitative data analysis" or "quantitative data analysis" or "writing research" or "conducting research" (Title)
5	"artificial intelligence" or "large language model*" or "chatGPT" or "GPT" (Title) and "high* education" or "graduate*" or "university" or "researcher*" or "student*" (Title)
4	"artificial intelligence" or "large language model*" or "chatGPT" or "GPT" (Title) and "research ethics" or "research integrity" or "research misconduct" (Title)
Applied limitations	#12 OR #11 OR #5 OR #4 and Article or Early Access or Review Article or Book Chapters or Book or Correction (Document Types)
Total from Web of Science Core Collection	608
1	(TITLE-ABS-KEY ("artificial intelligence" OR "large language model*" OR "chatGPT" OR "GPT" AND "research ethics" OR "research integrity" OR "research misconduct") OR TITLE-ABS-KEY ("artificial intelligence" OR "large language model*" OR "chatGPT" OR "GPT" OR "AI" AND "qualitative data analysis" OR "quantitative data analysis" OR "writing research" OR "conducting research") OR TITLE-ABS-KEY ("artificial intelligence" or "large language model*" or "chatGPT" or "GPT" or "AI" and "plagiarism" or "fake research" or "fake research paper" or "research misconduct"))
Total from Scopus	1199
1	(TITLE ("artificial intelligence" OR "large language model*" OR "chatGPT" OR "GPT" AND "research ethics" OR "research integrity" OR "research misconduct") OR TITLE ("artificial intelligence" OR "large language model*" OR "chatGPT" OR "GPT" OR "AI" AND "qualitative data analysis" OR "quantitative data analysis" OR "writing research" OR "conducting research") OR TITLE ("artificial intelligence" OR "large language model*" OR "chatGPT" OR "GPT" OR "AI" AND "plagiarism" OR "fake research" OR "fake research paper" OR "research misconduct")) Filters: Publication Type
Total from Lens	(20,244)

The most recent and relevant studies were identified using the features provided by the Web of Science and Scopus to view the studies sorted by relevancy and recency. We reviewed the studies to check their relevance to our topic, and then we included them for thematic analysis. This step was crucial to balance our analysis between the quantitative approach (for the scientometric analysis) and the qualitative approach for thematic analysis. For removing duplicates, we used Mendeley to remove duplicates for thematic analysis. We also used CiteSpace to remove duplicates for scientometric analysis.

2.2. Design

Employing a mixed-methods approach, our study integrated quantitative cluster analysis with inferential statistical methods, specifically the Chi-squared test. This was complemented by a qualitative thematic analysis, creating a robust and multifaceted research design that allowed for a comprehensive exploration of the ethical and responsible use of AI in HE.

2.3. Measures

For the quantitative analysis, we utilized CiteSpace (Version 6.3.R1) and VOSviewer (Version 1.6.19) for sophisticated cluster analysis and data visualization, capturing the nuanced landscape of AI utilization in higher education. The qualitative thematic analysis was meticulously driven by the themes emerging from the cluster analysis. This process leveraged the most salient studies, ensuring a rigorous and focused examination of the subject matter. CiteSpace is a data analysis tool primarily used for visualizing and analyzing trends and patterns in scientific literature. It employs algorithms such as co-citation, clustering, and burst detection to identify key areas of research, influential authors, and emerging trends [45]. VOSviewer, on the other hand, is a tool for creating and visualizing bibliometric networks. It uses algorithms like co-occurrence, co-authorship, and co-citation to construct these networks, and its unique feature is the ability to display these networks in a 3D, interactive format [46].

The databases used in this study, Web of Science, Scopus, and Lens, each have their own inherent biases. Web of Science and Scopus, for example, tend to favor English-language publications and research from developed countries, potentially underrepresenting perspectives from other regions. Lens, while broader in scope, may still exhibit publication biases towards certain research areas or institutions. These biases could influence the results by skewing the scientometric analysis towards trends and potentially overlooking significant contributions from underrepresented communities or languages. However, using these databases together enhances the robustness and reliability of the analysis by offering a comprehensive and diverse dataset. While Web of Science and Scopus ensure high-quality data with their extensive coverage of peer-reviewed journals, Lens adds breadth by including grey literature. This multi-database approach mitigates individual biases, providing a balanced and inclusive view of global research trends.

2.4. Reliability, Validity, and Trustworthiness

The quantitative data underwent rigorous screening for internal validity, ensuring all studies pertained precisely to the ethical application of AI in HE. External validity was addressed by formulating results that potentially extend to varied instances of AI usage within an educational, moral framework. Reliability was fortified through meticulous documentation of our methodological process, including data collection parameters and analytical procedures utilizing Jamovi (Version 2.3.26) for inferential testing. Objectivity was maintained throughout the quantitative analysis.

For the qualitative dataset, credibility was attained through peer debriefing, establishing confidence in our findings. Transferability was assured via a detailed portrayal of our methodological execution, granting the research applicability across contexts. Dependability was guaranteed through external auditing, where an independent researcher assessed the methodological process and the unity of findings with data. Confirmability was approached by employing triangulation, utilizing multiple databases to eliminate researcher bias and ensure neutrality in data extraction.

To ensure the authenticity and reliability of the data, a multi-pronged validation approach was employed. After compiling the initial dataset, duplicate entries were meticulously removed using CiteSpace for the scientometric analysis and Mendeley for thematic analysis. Subsequently, a manual screening process was conducted to verify the relevance of each study to the research topic, focusing on the ethical implications of AI in higher education for thematic analysis. For the scientometric analysis, we restricted our search to papers that included our search strings in the title, abstract, and keywords. This rigorous screening process involved examining titles, abstracts, and, where necessary, full texts to confirm alignment with the study's scope and objectives. This meticulous approach ensured the inclusion of only pertinent and authentic data points, bolstering the validity and trustworthiness of the findings.

2.5. Procedure

Our search strategy entailed querying the Web of Science, Scopus, and Lens databases with precision-targeted terms to extract data germane to the ethical use of AI in HE. These data were then processed through CiteSpace and VOSviewer for cluster analysis. We meticulously identified the most relevant and recent studies, which were then subjected to thematic analysis. This analysis categorized studies according to their support, opposition, or mixed perspectives on AI usage in HE, followed by inferential statistics to ascertain the significance of these categories. Initial thematic analysis was based on clusters derived from the quantitative data, with subsequent extraction from the most relevant studies. The research team critically evaluated the data for topic relevance, with additional scrutiny applied to study selection to ensure alignment with the research focus. Finally, a conceptual model encapsulating the responsible and ethical use of AI in HE, along with implementation solutions, was developed and presented in the results.

3. Results

The results section comprises two main parts: a scientometric analysis and a content analysis. In the first part, we employ scientometric indicators to assess the ethical and responsible use of AI in higher education and its unethical and irresponsible applications. This includes an examination of citation bursts, co-occurrence of keywords, cluster analysis, and the centrality of terms. The second part involves a thematic analysis of the most pertinent and current studies in the field, supplemented by inferential statistical testing. The culmination of this section is a conceptual model that delineates the present state of AI usage in higher education with respect to ethical considerations and suggests practical solutions for its implementation.

3.1. Scientometric Analysis

Figure 1 illustrates a scientometric analysis showcasing the most robust citation bursts across various subject categories from 1987 to 2024. It identifies significant surges in scholarly attention as measured by citation frequency within specific timeframes. Notably, computer science, particularly artificial intelligence, experienced the most pronounced spike in citations from 2020 to 2021, indicating a period of heightened academic focus and potentially groundbreaking research developments. Additionally, disciplines such as radiology, nuclear medicine and medical imaging, and multidisciplinary engineering also show considerable citation bursts, suggesting a cross-disciplinary interest in integrating AI technologies. This pattern of citation activity reflects the evolving research landscape, and the pivotal role AI is playing in driving academic discourse and innovation across diverse scientific fields. The green line represents the research period, while the red line denotes the start and finish of the burst phase.

Subject Categories	Year	Strength	Begin	End	1987–2024
Computer Science, Artificial Intelligence	1987	4.46	2020	2021	
Radiology, Nuclear Medicine and Medical Imaging	2019	3.12	2019	2020	
Engineering, Multidisciplinary	2019	2.05	2019	2022	
Engineering, Electrical and Electronic	1992	2.02	2021	2022	
Education and Educational Research	1989	1.84	2014	2017	
Mathematical and Computational Biology	2021	1.69	2021	2022	
Computer Science, Interdisciplinary Applications	2014	1.62	2014	2020	
Materials Science, Multidisciplinary	2021	1.29	2021	2022	
Computer Science, Software Engineering	1992	1.05	1992	2022	
Clinical Neurology	2020	0.91	2020	2021	

Figure 1. Top 10 subject categories with the strongest citation bursts.

Figure 2 presents a density visualization that maps out the co-occurrence of keywords at the nexus of AI, ethics, and HE. Through the analysis, four distinct clusters emerge, each differentiated by color based on the relative intensity and frequency of the keywords within. The blue cluster encapsulates the academic aspects of AI, with keywords like 'academic integrity', 'computational linguistics', and 'intellectual property', suggesting a focus on the scholarly implications of AI technology. The red cluster delves into the application of AI in healthcare research, highlighting terms such as 'methodology' and 'clinical research', indicating a specialized engagement with AI in medical contexts. In the green cluster, the focus shifts to medical education, where 'ethics' and 'plagiarism' are prominent, pointing to the ethical considerations and challenges in using AI within educational settings. Finally, the yellow cluster concentrates on the realm of publishing, with 'writing' and 'scientific misconduct' as critical concerns, reflecting the issues around the integrity and ethical dissemination of research in the age of AI. Each cluster provides insights into the multifaceted relationship between AI, ethics, higher education, and the research landscape.

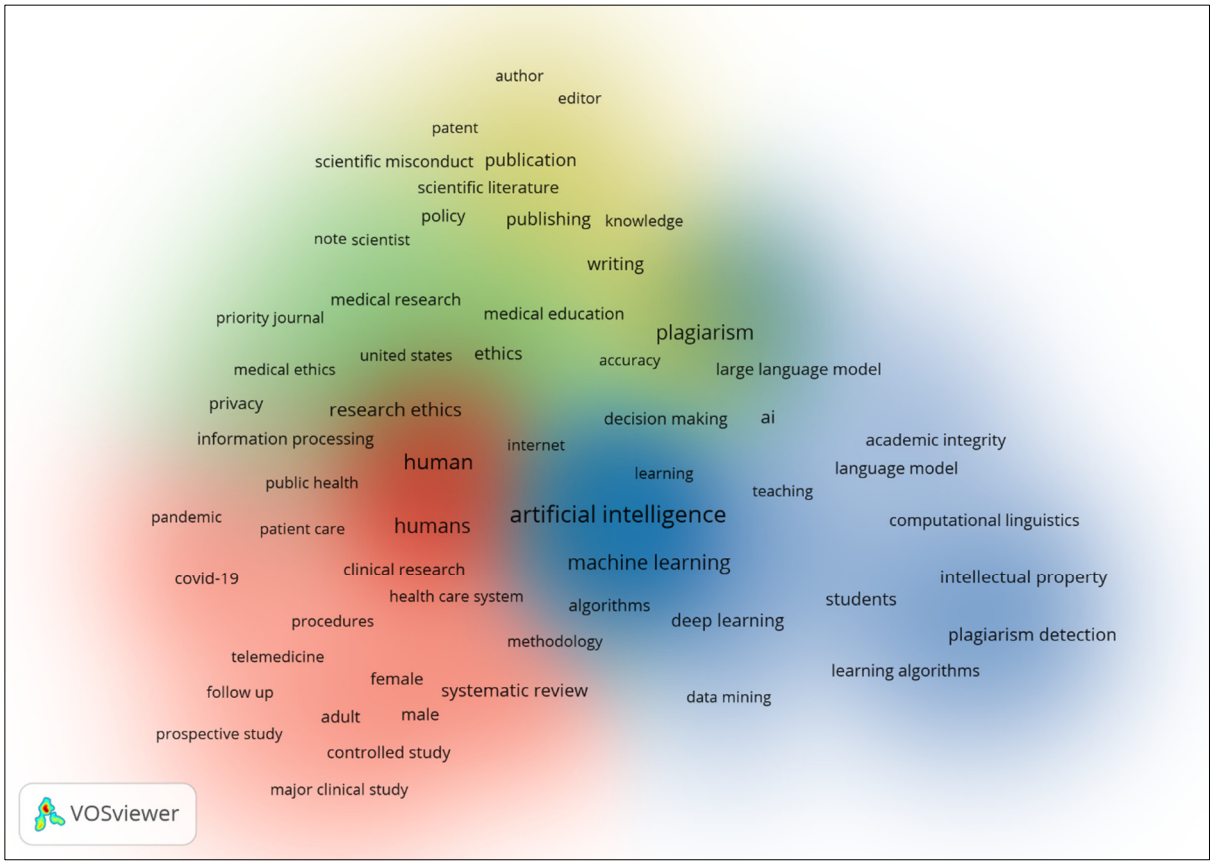

Figure 2. Density visualization of co-occurrence using data from Web of Science, Scopus, and Lens databases.

Figure 3 visually represents the key terms frequently mentioned in the latest and most pertinent studies at the intersection of AI, ethics, and HE. The analysis has distilled the data into four color-coded clusters, each signifying a different thematic concentration. Dominating the visualization is the green cluster, which represents the core concept of AI, highlighting prevalent terms such as 'large language models' and 'ethics', pointing to the ethical dimensions of innovative AI technologies. The second cluster, shaded in red, focuses on higher education, encompassing terms like 'generative AI' and 'academic integrity', reflecting the impact of AI on educational values and practices. In the third cluster, colored in blue, the emphasis is on students, with keywords such as 'plagiarism

detection' and 'intellectual property', indicating concerns and tools relevant to student engagement with AI. Lastly, the yellow cluster relates to chatbot technology, with 'natural language processing' as a notable term, pointing to the technical aspects of AI interfaces in educational settings. Together, these clusters form a cohesive overview of the prevailing themes and issues surrounding the integration of AI within the ethical and academic spheres.

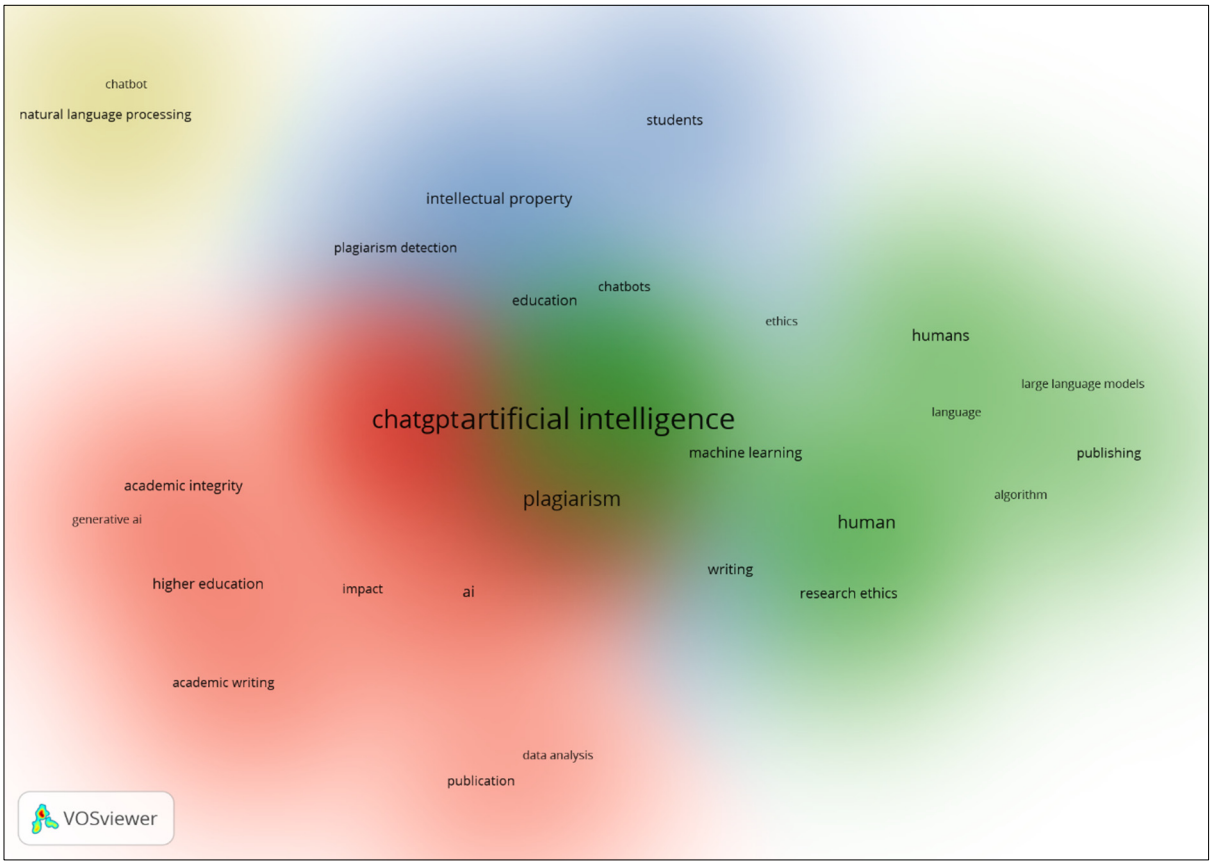

Figure 3. Density visualization of co-occurrence using data of the most relevant studies from Web of Science, Scopus, and Lens databases.

Figure 4 displays a scientometric analysis revealing the strongest bursts for keywords from 1987 to 2024, indicating periods of intense academic focus and discussion. "Machine learning" led the surge beginning in 2019, reflecting its growing influence and research interest, which sharply increased until 2020. Similarly, "college students" have maintained a sustained citation burst from 2019 to 2022, suggesting a heightened exploration of their experiences and roles in the context of evolving educational technologies. "Networks" and "neural networks" both show concentrated bursts of scholarly attention, pointing to significant advancements and interest in these areas related to AI's practical applications and theoretical underpinnings. Keywords such as "behavior", "knowledge", "prediction", "autonomous learning", "competencies", and "artificial intelligence technology" also demonstrate notable bursts, emphasizing the diverse yet interconnected aspects of AI research and its implications across various domains, including education, technology, and cognitive science. The red indicators on the timeline denote the active periods of each burst, providing a visual summary of the research landscape's shifting interests over time. The green line represents the research period, while the red line denotes the start and finish of the burst phase.

Keywords	Year	Strength	Begin	End	1987–2024
machine learning	2019	2.35	2019	2020	
college students	2019	2.27	2019	2022	
networks	2020	2.22	2020	2021	
neural network	2003	2.14	2021	2022	
behavior	2020	1.8	2020	2022	
knowledge	2018	1.56	2018	2019	
prediction	2017	1.55	2017	2022	
autonomous learning	2018	1.31	2018	2019	
competences	2019	1.23	2019	2020	
artificial intelligence technology	2021	1.21	2021	2022	

Figure 4. Top 10 keywords with the strongest citation bursts.

Figure 5 indicates the strongest bursts for specific terms from 1987 to 2024, revealing trends and areas focused on scholarly research. "College students" stands out with the highest citation burst starting in 2021, suggesting a surge in research interest possibly related to the impact of technological advancements or educational methodologies on this demographic. "Artificial intelligence technology" follows, with a significant increase in citations from 2021 to 2022, highlighting AI's rapid development and integration across various fields. "Machine learning" and "neural network" also show substantial activity, reflecting ongoing interest and breakthroughs in these foundational AI technologies. Other terms like "basic knowledge", "medical student", "information technology", and "medical schools" indicate a convergence of interest in the application of technology in educational settings, particularly within the medical field. "Student performance" and "clinical practice" suggest a focus on such research's outcomes and real-world applications. The red bars represent the duration of each burst, with most of the activity concentrated in recent years, underscoring the accelerating pace of research in these areas. The green line represents the research period, while the red line denotes the start and finish of the burst phase.

Terms	Year	Strength	Begin	End	1987–2024
college students	2018	9.38	2021	2022	
artificial intelligence technology	2021	6.76	2021	2022	
machine learning	1987	3.9	2019	2021	
neural network	2019	3.16	2019	2022	
basic knowledge	2021	2.25	2021	2022	
medical student	2021	2.25	2021	2022	
information technology	2021	2.25	2021	2022	
medical schools	2021	1.98	2021	2022	
student performance	2020	1.97	2020	2022	
clinical practice	2020	1.91	2020	2021	

Figure 5. Top 10 terms with the strongest citation bursts.

Table 2 synthesizes ten distinct clusters within AI research, with each cluster's thematic focus identified through various labeling methods and its temporal context indicated by the average year. Cluster 0, the largest with eighty-eight entries, is characterized by a strong focus on machine learning, evidenced by its high silhouette score of 0.927 and labels from different methods converging on this theme. Cluster 1, comprising eighty-five entries, centers on artificial intelligence in the context of higher education and reflects a broad interest in how university students engage with AI. Cluster 2, with seventy-six members,

indicates a concentration of knowledge on attitudes within AI, particularly in medical diagnostics programs. Cluster 3's 44 entries focus on the technology aspect of AI, relating to student performance metrics in academic evaluations. Cluster 4, consisting of forty-three members, delves into knowledge perception, signaling a solid educational component within AI studies. In contrast, Cluster 5, with forty-two members and a high silhouette score of 0.903, explores college students' behavior in relation to AI and physical exercise. Learning evaluation is at the heart of Cluster 6, which has a notably high silhouette score of 0.96, reflecting a cohesive analysis of AI's role in educational assessment. Cluster 7, with thirty-one entries, discusses AI literacy programs, pointing to a pedagogical approach to AI. Cluster 8, though smaller with twenty-four entries, achieves a perfect silhouette score of one, indicating a very tight-knit focus on evaluating student answers through the lens of vague set theory, a niche yet distinct area of AI application. Lastly, Cluster 11, with nine entries and another perfect silhouette score, concentrates on data-driven modeling, particularly in the context of training PhD students in Luxembourg. Overall, these clusters reveal the rich diversity and depth of AI research across various domains, with a particular emphasis on educational applications, methodology, and the evolution of technology and modeling approaches over time.

Table 2. Summary of the largest 10 clusters.

Cluster-ID	Size	Silhouette	Label (LSI)	Label (LLR)	Label (MI)	Average Year
0	88	0.927	artificial intelligence	machine learning	quality evaluation	2012
1	85	0.696	artificial intelligence	artificial intelligence	university students use	2022
2	76	0.82	artificial intelligence	knowledge attitude	diagnosing program	2021
3	44	0.823	artificial intelligence	artificial intelligence technology	student performance over a week	2020
4	43	0.765	artificial intelligence	knowledge perception	education	2022
5	42	0.903	artificial intelligence	college student	physical exercise behavior	2020
6	31	0.96	artificial intelligence-based student	learning evaluation	artificial intelligence	2005
7	31	0.84	artificial intelligence	artificial intelligence literacy program	quality evaluation	2021
8	24	1	artificial intelligence approach to evaluating students' answer scripts based on the similarity measure between vague sets	vague set	artificial intelligence	2008
11	9	1	mathematical modeling and artificial intelligence in Luxembourg: twenty PhD students to be trained in data-driven modeling	data-driven modeling	artificial intelligence	2018

3.2. Centrality

Table 3 presents a network analysis of nodes within the research landscape of AI, indicating their centrality and associated cluster IDs, which denote specific research themes or contexts. The term "artificial intelligence" emerges as the most central node with a centrality score of 0.59, signifying its overarching influence and frequent connections to other terms within the central cluster 0. This is followed by "machine learning" with a centrality of 0.19, underscoring its importance as a subset of AI research within the same cluster. The term "artificial intelligence approach" in cluster 8 shows a significant centrality of 0.14, pointing to specialized AI methodologies. "Higher education" and another instance of "artificial intelligence" in clusters 0 and 5 indicate a strong relationship between AI and educational contexts. The centrality of "artificial intelligence techniques" in cluster 6 suggests a focus on practical AI applications. In contrast, "education institutions" in cluster 1 and "artificial intelligence technology" in cluster 3 reflect AI's impact on

educational frameworks and technological developments. The term "medical students" in Cluster 2 highlights the relevance of AI in medical education, and "important role" in Cluster 3 suggests a recognition of AI's noteworthy influence in various domains. These centrality measures reveal the pivotal nodes within the AI research network, indicating the most influential concepts and their inter-cluster connections.

Table 3. Top 10 nodes by centrality.

Centrality	Node Name	Cluster-ID
0.59	artificial intelligence	0
0.19	machine learning	0
0.14	artificial intelligence approach	8
0.12	higher education	0
0.11	artificial intelligence	5
0.10	artificial intelligence techniques	6
0.08	education institutions	1
0.08	artificial intelligence technology	3
0.07	medical students	2
0.07	important role	3

3.3. Thematic Analysis

Table 4 presents a synthesized overview of current research examining the ethical integration of AI in higher education. The studies collectively offer a comprehensive perspective on how AI tools like ChatGPT are perceived, utilized, and regulated within academic contexts. We used three background colors to indicate the position of each study: gree: supporting and promoting the use of AI, orange: opposing and warning, and blue: mixed views on the use of AI when conducting research. Key takeaways indicate broad support for AI's potential to enhance educational practices, with repeated calls for robust ethical frameworks and informed policies to govern its use. Concerns about academic integrity, the need for human oversight, and the implications of AI on learning outcomes are recurrent themes. Mixed positions reveal the nuanced complexities of AI adoption, balancing its benefits against potential risks of misuse and the challenges of maintaining academic standards. The overarching consensus underscores an initiative-taking stance towards responsible AI integration, emphasizing the significance of ethical considerations and the development of strategies to ensure AI's positive impact on the educational landscape.

The three thematic clusters were generated through a careful and systematic analysis of the twenty-four studies, focusing on the intersection of AI's responsible use and ethical considerations in higher education. By examining the aims, findings, and implications of each study, patterns, and common themes were identified and grouped into broader categories. Cluster 1 emerged from studies emphasizing the need for ethical guidelines and policy frameworks, reflecting a consensus on the foundational role of governance in AI integration. Cluster 2 was derived from research highlighting concerns about AI in content creation and the maintenance of academic integrity, where the potential for AI to both support and undermine traditional academic values was discussed. Finally, Cluster 3 was identified by looking at studies that investigated student engagement with AI tools and the subsequent impact on their learning outcomes and perceptions of academic honesty. Across these clusters, insights were drawn by synthesizing the nuanced discussions within each study, revealing the complex and multifaceted nature of AI's role in higher education and the imperative for ethical, considered implementation.

Table 4. Ethical integration of AI in higher education: a synthesis of the most recent and relevant research.

No.	Citation	Aim	Findings	Relevance or Implication to Responsible Use of AI in HE	Position
1	[47]	To investigate researchers' knowledge, perceptions, and attitudes toward using ChatGPT in academic research.	Many researchers have utilized ChatGPT in their research for tasks like rephrasing and citation generation, with ethical concerns about AI's role in research.	Highlights the need for regulations to ensure the ethical use of AI tools like ChatGPT in research activities.	**Supports**—The study acknowledges the use of AI but calls for proper training and regulation to ensure ethical use.
2	[48]	To propose a human-centered AI approach in higher education for equitable knowledge access while maintaining privacy and ethics.	Development of an Ethical AI in Education (EAIED) platform integrating AI with pedagogical strategies and ethical guidelines.	Emphasizes the importance of ethical considerations and privacy in AI applications in education.	**Supports**—Provides an ethical framework for AI integration in education.
3	[49]	To analyze the impact of artificial intelligence on higher education and scientific research.	AI's impact on higher education is significant and multifaceted, emphasizing ethical considerations based on the United Nations Educational, Scientific and Cultural Organization (UNESCO's) recommendations.	Advocates for ethical AI use, recognizing its transformative potential and challenges.	**Supports**—The study supports the responsible use of AI, underlining the ethical dimension.
4	[50]	To discuss the ethical implications and potential misuse of ChatGPT in education.	Raises key issues regarding AI's role in education, such as plagiarism and the need for curriculum adaptation.	Calls for policies to ensure AI is used ethically and responsibly in educational settings.	**Mixed**—Recognizes benefits while also addressing the potential for misuse in academic settings.
5	[51]	To review the global use of ChatGPT in higher education.	ChatGPT is widely used for diverse academic purposes, but issues like reliability and scholarly integrity are of concern.	Proposes a framework for ethical AI use in higher education to mitigate concerns.	**Mixed**—Acknowledges ChatGPT's utility while highlighting ethical concerns.
6	[52]	To evaluate the utility of ChatGPT in writing scientific review articles on COVID-19's impact on musculoskeletal health.	ChatGPT assists in drafting scientific articles, but human fact-checking and editing are crucial for accuracy.	It suggests that AI can support but not replace human expertise in scientific writing.	**Supports**—Affirms the value of AI as an aid, with human oversight to ensure responsibility.
7	[53]	To introduce researchers to AI and machine learning (ML) in neuroscience.	While ML can identify complex patterns, its limitations and ethical implications must be considered.	Stresses the need for external validation and ethical use of ML in research.	**Supports**—Encourages responsible ML use with awareness of its limitations and ethical issues.
8	[54]	To assess dentists' and dental students' understanding of AI in their field.	There is a need for more AI education in dentistry to realize its potential benefits.	Implies that responsible AI adoption in dental education requires enhanced AI literacy.	**Supports**—Suggests that the ethical use of AI requires better educational programs in dentistry.
9	[55]	To investigate the impact of generative AI on academic norms and the need for clear university policies.	Generative AI usage by students and staff raises ethical ambiguities due to unclear institutional policies.	Urges the creation of clear policies for the ethical use of AI in academic writing.	**Mixed**—Points to ethical challenges and the need for policy while recognizing AI's potential.
10	[56]	To compare scientific abstracts generated by ChatGPT with real abstracts.	ChatGPT generates believable abstracts, but differences in authenticity are notable.	Indicates the need for tools to maintain standards and ethical use of AI in scientific writing.	**Mixed**—Highlights AI's capabilities and the ethical considerations needed for its application.
11	[57]	To explore the effectiveness of anti-plagiarism and anti-cheating policies in the AI era.	Finds a positive association between the presence of policies and resources facilitating unethical behavior, suggesting current policies may be ineffective.	Calls into question the effectiveness of current policies against AI-assisted academic dishonesty.	**Opposes**—Suggests that existing policies are insufficient to address AI-assisted plagiarism.
12	[58]	To evaluate the impact of AI tools on learning and teaching in higher education, as perceived by students.	Positive student perceptions of the educational impact of AI tools, highlighting areas for increased integration.	Advocates for integrating AI as a pedagogical tool, emphasizing the need for skill development.	**Supports**—Endorses AI's positive role in education, calling for increased proficiency.
13	[59]	To examine the ethical challenges AI and chatbots pose in research integrity and publication ethics.	Raises concerns about authorship, plagiarism, and empathy in AI-generated content, advocating for new ethical guidelines.	Urges a re-evaluation of research ethics considering AI advancements to maintain integrity.	**Mixed**—Acknowledges benefits but emphasizes the need for ethical guidelines for AI use in research.
14	[60]	To investigate the relationship between attitudes towards plagiarism and the use of ChatGPT for academic dishonesty.	Positive correlation between attitudes towards plagiarism and the use of ChatGPT for academic dishonesty.	This implies the need to address the underlying attitudes towards plagiarism for ethical AI use.	**Opposes**—Suggests a link between positive attitudes towards plagiarism and misuse of AI.
15	[61]	To analyze the current bibliometric state of AI in higher education.	Steady growth in AI studies, with China and the US leading, and a focus on ethical challenges.	Highlights the need for continued ethical consideration in the expanding field of educational AI.	**Supports**—Indicates a growth in AI research emphasizing responsible use.
16	[62]	To ascertain how ChatGPT can complement teacher assessments of student writing.	ChatGPT shows consistency with teacher evaluations but highlights the need for human feedback.	Supports the combined use of AI and human expertise to enhance writing instruction.	**Supports**—Promotes a balanced approach to AI use, combining it with human insights.
17	[63]	To assess the impact of ChatGPT on English as Second Language (ESL) students' academic writing skills.	ChatGPT has a significant positive impact on writing skills, with students perceiving it as a beneficial feedback tool.	Encourages using ChatGPT as a feedback tool in writing, with appropriate student training.	**Supports**—Affirms the positive role of AI in improving academic writing, with ethical use in mind.
18	[64]	To review the impact of AI in higher education over the past decade.	Identifies a surge in AI-related publications, with a need to validate empirical AI applications.	Stresses the importance of evidence-based AI applications in education for responsible integration.	**Supports**—Calls for empirical evidence to inform responsible AI integration in education.

Table 4. *Cont.*

No.	Citation	Aim	Findings	Relevance or Implication to Responsible Use of AI in HE	Position
19	[65]	To explore students' experiences with ChatGPT in essay writing.	Students find ChatGPT useful but recognize the need to fact-check to avoid academic dishonesty.	Suggests that while AI can assist in education, ethical use requires vigilance against misinformation.	**Mixed**—Sees AI as a beneficial tool but cautions against potential academic dishonesty.
20	[66]	To understand factors influencing students' adoption of ChatGPT in education.	Attitude and policy are significant in shaping students' AI use, with policy having a moderating effect.	Highlights the role of institutional policy in guiding the ethical adoption of AI in higher education.	**Supports**—Emphasizes the importance of policy in responsible AI adoption by students.
21	[67]	To discuss the potential role of ChatGPT in automating systematic reviews.	ChatGPT shows promise but requires development for accurate application in systematic reviews.	Cautions against premature reliance on AI for research, advocating for responsible development.	**Mixed**—Sees potential in AI but warns against its current limitations and misuse.
22	[68]	To discuss the potential of AI in assisting with scientific writing.	AI, specifically ChatGPT, can be helpful in organizing material and drafting scientific writing, but it should not replace human judgment; ethical issues such as plagiarism and accessibility were also considered.	Emphasizes the need for responsible supervision when using AI for scientific writing and highlights ethical considerations such as plagiarism and equitable access.	**Supports**—Encourages the use of AI in scientific writing while advocating for ethical practices and human oversight.
23	[69]	To explore student experiences with ChatGPT in essay-writing assignments and its implications for learning and grading.	ChatGPT was seen as valuable for learning, but students expressed concerns about its grading capabilities and accuracy, preferring human oversight.	Indicates the importance of understanding student perceptions for responsible and trust-building integration of AI in assignments.	**Mixed**—Recognizes the value of ChatGPT as an educational tool but also emphasizes the need for ethical oversight in grading.
24	[70]	To differentiate between ChatGPT-generated and human-written academic papers through stylometric analysis.	Stylometric analysis can effectively distinguish between texts generated by AI and those written by humans, with high accuracy, using specific features.	Demonstrates the potential for using analytical tools to ensure academic integrity in the face of AI-generated content.	**Supports**—Suggests the use of analytical tools to maintain ethical standards in academic writing.

3.3.1. Cluster 1: Ethical Frameworks and Policy Development

The responsible use of AI in higher education necessitates the establishment of ethical frameworks and the development of policies that address both the potential and the challenges posed by AI technologies. Studies by [48,55] exemplify the discourse on creating comprehensive policies that support ethical AI integration. Airaj emphasizes a human-centered AI approach that adheres to ethical guidelines, ensuring equitable access and privacy [48]. Similarly, Duah and McGivern highlight the need for university policies that clarify generative AI's role in academic writing, like ChatGPT, thus mitigating ethical ambiguities [55]. These contributions underscore the importance of initiative-taking policy-making in navigating the complex moral landscape of AI in higher education. They serve as a call to action for educational institutions to craft policies that are not only reactive to the current state of technology but also anticipatory of future advancements.

The development of such frameworks and policies is further supported by the findings of Polyportis and Pahos, who investigate the factors influencing students' adoption of AI technologies [66]. Their study reveals how institutional policies can shape the responsible use and perception of AI among students. This body of research collectively suggests that effective policy-making and ethical guidelines are crucial for fostering an environment in which AI can be used responsibly to support educational outcomes. These studies provide a foundation for academic institutions to consider the multifaceted implications of AI, ensuring that its integration into higher education is conducted in a manner that upholds academic integrity and ethical standards.

3.3.2. Cluster 2: Academic Integrity and the Role of AI in Content Creation

The intersection of AI with academic integrity and content creation in higher education has been a focal point of recent research. The studies by Gao et al. and Ansari et al. highlight concerns about the authenticity of AI-generated content and its implications for academic standards [51,56]. Gao et al. compare scientific abstracts generated by ChatGPT with those written by humans, pointing out the necessity for tools to maintain standards and ethical use of AI in scientific writing [56]. Ansari et al. further examine the global use of ChatGPT in higher education, acknowledging its convenience while also drawing attention to issues related to accuracy, reliability, and academic integrity [51]. These findings suggest a critical

need for mechanisms that can distinguish between human and AI-generated content to preserve the integrity of academic work.

The theme of academic integrity is also reflected in the study by Zaitsu and Jin, who investigate the capacity to differentiate AI-generated papers from those authored by humans [70]. Their research demonstrates the effectiveness of stylometric analysis as a tool for maintaining ethical conduct in academic writing. Collectively, these studies imply that, while AI has the potential to aid the educational community significantly, there must be stringent checks and balances to prevent the erosion of scholarly standards. The research calls for a balance between embracing the efficiencies provided by AI and maintaining the traditional values of academic rigor and originality.

3.3.3. Cluster 3: Student Interaction with AI and Learning Outcomes

Research on student interaction with AI tools in higher education reveals insights into how these technologies influence learning processes and outcomes. Tossell et al. examine student perceptions of using ChatGPT in college essay assignments, noting that while students find value in AI for learning, they also express a need for human oversight, particularly in grading [69]. This study reflects concerns about the ability of AI to accurately assess and enhance learning without undermining the educational experience. Similarly, Mahapatra explores the impact of ChatGPT on ESL students' academic writing skills, finding that students perceive the tool as beneficial for providing formative feedback [63]. These studies suggest that AI can be an asset in education when used as a complement to traditional learning methods.

However, studies also point to potential drawbacks, such as those mentioned by Nugroho et al., who discuss students' critical views on the accuracy of information generated by AI and its implications for academic dishonesty [65]. Such concerns highlight the necessity for educators to guide students in critically engaging with AI tools, ensuring that they are used to support, rather than replace, the development of critical thinking and analytical skills. The research collectively advocates for a measured approach to integrating AI into the learning environment, one that enhances the educational experience while also upholding the principles of academic honesty and the pursuit of genuine understanding.

3.4. Quantitative Analysis of the Studies

A Chi-squared test was conducted to examine the frequency of studies categorized by their reporting on the ethical and responsible use of AI in higher education, mixed reporting, and reporting unethical and irresponsible use of AI. The observed frequencies were zero, one, and zero for ethical and responsible use, zero, zero, and one for mixed reporting, and one, zero, and zero for unethical and irresponsible use, respectively, with each category expected to have an equal frequency of 0.33333. The Chi-squared statistic (χ^2) was 6.0000 with four degrees of freedom (df) and a p-value of 0.199, which was not significant at the conventional 0.05 level. The contingency coefficient was calculated to be 0.81650, suggesting a strong association between study categories and their reported frequencies, although this result was not statistically significant (N = 3). This indicates that there was no significant difference in the frequency of studies reporting on the ethical aspects of AI use in higher education across the three categories.

The non-significant Chi-squared test result, with a p-value of 0.199, indicates that there is no statistically significant difference in the frequency of studies reporting ethical and responsible use, mixed reporting, or unethical and irresponsible use of AI in higher education. This implies that, based on the data, one cannot assert a predominant trend in how AI's application in higher education is being reported in the literature regarding ethical considerations. Consequently, further research may be necessary to understand the patterns of AI use in higher education and to determine if there are indeed ethical concerns or commendable practices that are more prevalent in academic studies. Figure 6 shows the distribution of the included studies for quantitative analysis.

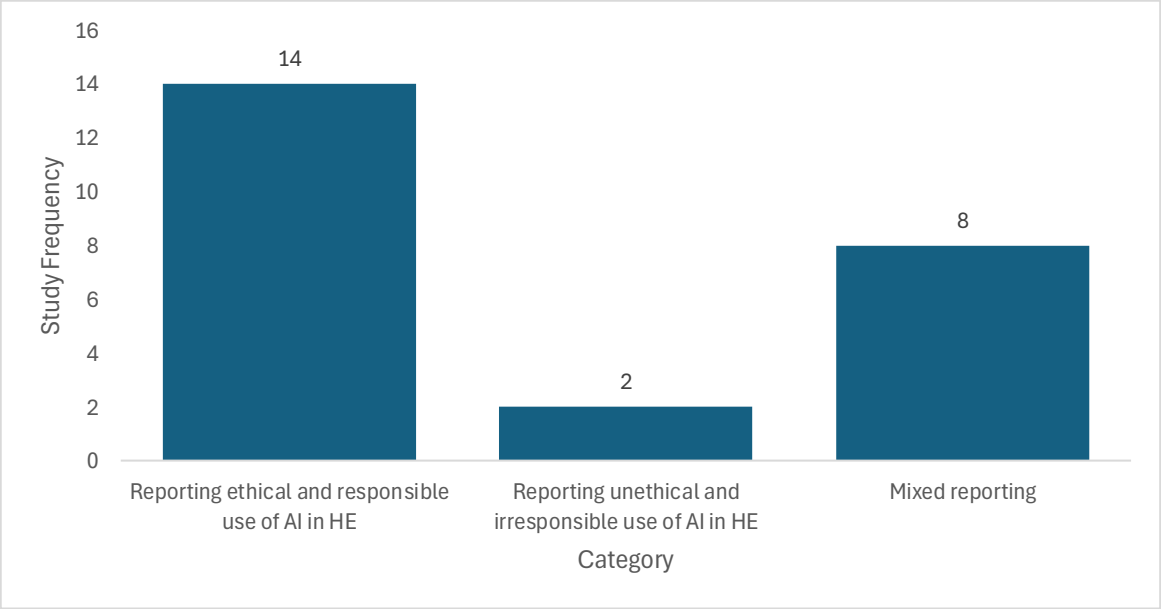

Figure 6. Distribution of the most recent and relevant studies by reported use of AI ethics in HE.

3.5. Conceptualizing Ethical AI in Academia

The conceptual model in Figure 7, for responsible AI use in HE, encapsulates the dichotomous perspectives on AI presented in current literature, weaving them into a structured framework that addresses the ethical challenges and opportunities AI introduces. At its core, it identifies the conflict between the promotion of AI's potential to enhance learning, the opposition due to risks to academic integrity, and the mixed views that recognize both the benefits and pitfalls of AI use. To navigate this complexity, the model proposes a set of integrated solutions: the establishment of robust ethical policies, comprehensive AI literacy and training, deployment of advanced plagiarism detection tools (i.e., if they do not raise other ethical considerations involving false-positive or false-negative detections, with reference to signal detection theory in psychology and confusion matrix in machine learning), and a commitment to ethical AI research and development. These components function synergistically to create a balanced ecosystem where AI can be leveraged for educational advancement while maintaining the highest standards of academic integrity and ethical practice. The model serves as a blueprint for institutions to systematically approach the integration of AI in a manner that is both progressive and principled.

The landscape of AI in higher education is one of dynamic tension between its potential for innovation and the imperative for ethical governance. On one side, research such as that by [48] advocates for the creation of comprehensive ethical guidelines and strategic integration of AI, with studies like Mahapatra's underscoring the positive outcomes of AI when students are effectively guided [63]. Conversely, concerns about the integrity of scholarship surface in works by Kasani et al., who warn of the risks of plagiarism [59], and Khalaf, who cautions against an over-reliance on AI that may lead to academic dishonesty [60]. This dichotomy is further expanded by Anders (2023) and Duah and McGivern, who, while acknowledging AI's potential, also stress the urgent need for policies to curb its misuse in academic settings [50,55].

Addressing this dichotomy calls for a multifaceted approach, as suggested by Polyportis and Pahos, beginning with the implementation of clear, comprehensive policies that govern AI usage [66]. These policies must be enforced by robust oversight mechanisms, ensuring that ethical standards are consistently met. In parallel, as Awosanya et al. recommend, educational programs should be introduced to cultivate an understanding of AI's capabilities and limitations, emphasizing ethical usage [52]. To support this educational framework, the development of critical thinking skills within the academic community is

essential, aiding in the responsible evaluation of AI-generated content. Tools for detecting AI-generated material, such as those investigated by Zaitsu and Jin, become instrumental in distinguishing authentic academic contributions from those generated by AI [70].

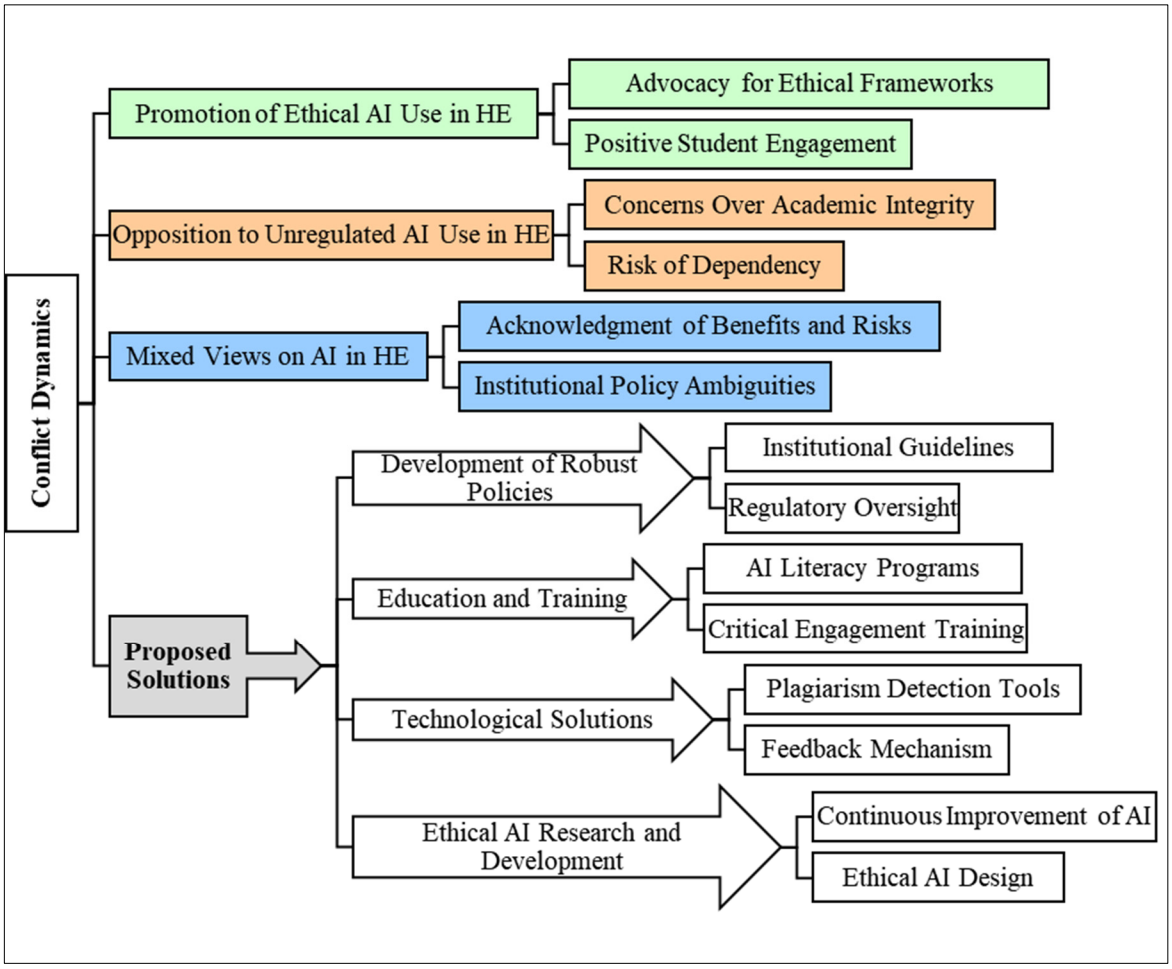

Figure 7. A framework for ethical AI integration in higher education: balancing innovation with integrity.

Furthermore, integrating AI-assisted feedback systems can complement traditional assessment techniques, thereby enhancing instructional integrity. To sustain the responsible evolution of AI in education, continuous research aimed at improving its accuracy and reliability is necessary, coupled with the involvement of ethicists, educators, and technologists in AI system design to ensure alignment with educational values and ethical standards. This interconnected approach promises to harness AI's potential responsibly, fostering an environment where technological advancement and academic integrity coexist.

4. Discussion

This study aimed to investigate the ethical integration of AI in HE and to provide a comprehensive overview of the current scholarly discourse on this topic. Our scientometric analysis identified key areas of research focus, while the thematic analysis revealed a consensus on the need for robust ethical frameworks and responsible AI usage in academic practices. The study also highlighted concerns over academic integrity and the management of AI-driven content creation, echoing the perspectives presented in previous studies [28,71].

The main findings of the study underscore the potential of LLMs to influence academic writing and scholarly communication significantly. These findings are consistent with the observations made by Alahdab and Williams, Ivanov, and Buhalis, who noted the

transformative role of LLMs like ChatGPT in knowledge creation and research tasks [4,8]. However, our study extends this discourse by emphasizing the ethical implications and challenges that accompany the integration of LLMs in HE, particularly about maintaining scholarly integrity and addressing issues such as plagiarism and intellectual property rights.

The study's focus on the ethical use of AI aligns with the recommendations of Porsdam Mann et al. and Yan et al., who both highlight the importance of addressing ethical concerns, such as privacy, data biases, and the potential reduction in output diversity [6,32]. The arguments presented in our study are further reinforced by the work of Hosseini, Resnik, and Holmes, who call for transparency in disclosing the use of AI tools in scholarly manuscripts [28]. This is an area where our findings diverge from the broader optimism seen in some of the literature; we suggest a more cautious approach to AI integration in academic settings to avoid undermining the diversity and quality of scholarly output.

Our analysis also confirms the insights from Muga and Baradziej, who stress the need for a balanced approach to the use of AI that maintains high ethical standards while exploiting the efficiency gains offered by LLMs [5,29]. The potential for AI to enhance educational practices, as seen in the work of [34], must be weighed against the need for human oversight and critical thinking, as suggested by [36,72].

The study's findings on the centrality of AI in educational contexts contribute to the discourse on AI's role in HE. They support the observations made by Shen et al. and Yan et al., who call for the establishment of emerging norms and a human-centered approach to AI integration in social computing and educational technology, respectively [6,73]. These considerations are crucial for ensuring that AI tools are used to enhance human capabilities rather than replace them.

In brief, our study contributes to the body of knowledge by providing a nuanced understanding of the ethical considerations surrounding AI in HE. It corroborates the views of previous studies that advocate for the judicious use of AI guided by ethical principles and human expertise (e.g., [74,75]). The study's synthesis of current research and identification of thematic clusters offers a roadmap for future research and policy development aimed at harnessing the benefits of AI while safeguarding academic integrity and ethical standards.

5. Limitations

The present study, while comprehensive, is not without its limitations. The scope of the data, drawn from a subset of academic databases, may not capture the full spectrum of discourse on the ethical use of AI in higher education, potentially omitting insights from grey literature, industry reports, and non-English publications that could offer valuable perspectives. Moreover, the reliance on scientometric and content analyses, though robust, may be inherently biased toward more quantifiable aspects of AI integration, possibly underrepresenting the qualitative nuances of individual experiences and institutional case studies. Additionally, the dynamic and rapidly evolving nature of AI technology means that findings may quickly become outdated, necessitating continuous updates to the research. These limitations underscore the need for ongoing, multidisciplinary research that includes broader data sources, longitudinal studies, and a variety of qualitative methodologies to fully understand the complexities and ever-changing landscape of AI in the academic environment.

6. Implications

The implications of this study are manifold, extending beyond academic circles to inform policymakers, educators, and AI developers. The identification of thematic clusters provides a framework for developing targeted ethical guidelines and educational programs that address specific AI applications in higher education. The study's findings also suggest the necessity for policymakers to consider adaptive regulatory mechanisms that can quickly respond to technological advancements. For educators, there is a clear indication of the need to integrate AI literacy into curricula to prepare students for a future where AI is an integral part of the academic and professional landscape. Additionally, AI developers

can draw from the insights on ethical challenges to design systems that are not only technologically advanced but also aligned with the values and norms of the educational community. Ultimately, the study serves as a call to action for a collaborative approach to AI governance in higher education, ensuring that its integration supports educational advancement while upholding ethical standards.

7. Conclusions

This study sheds light on the ethical integration of AI in higher education, revealing a complex interplay between technological potential and ethical responsibility. It elucidates the importance of developing robust ethical frameworks, transparent policies, and human-centered AI applications that collectively foster academic integrity and enhance educational practices. The study underscores the pivotal role of AI in reshaping higher education and the concomitant need for vigilance to prevent the erosion of scholarly standards. As the academic community stands at the cusp of a new era marked by AI-driven innovation, it must navigate this terrain with an unclouded vision that harmonizes the promise of AI with the imperatives of ethical stewardship and human-centric development. The path forward will require a concerted effort to embrace the benefits of AI while diligently addressing the ethical dilemmas it presents, ensuring that the academic enterprise continues to thrive in the age of artificial intelligence.

Author Contributions: Conceptualization, S.M.Q., A.A., Y.C. and M.K.; data curation, S.M.Q., A.A. and Y.C.; formal analysis, A.A.; funding acquisition, S.M.Q.; investigation, S.M.Q., Y.C. and M.K.; methodology, A.A.; project administration, S.M.Q.; resources, S.M.Q., Y.C. and M.K.; software, A.A.; supervision, S.M.Q.; validation, A.A.; visualization, A.A.; writing—original draft, S.M.Q., A.A., Y.C. and M.K.; writing—review and editing, S.M.Q., A.A., Y.C. and M.K. All authors have read and agreed to the published version of the manuscript.

Funding: The research was funded by the Qatar National Research Fund (QNRF), Academic Research Grant (ARG), granted to the College of Education, Qatar University, under the research project ARG01-0516-230177.

Institutional Review Board Statement: This research did not require IRB approval.

Informed Consent Statement: Neither human nor non-human subjects were involved directly in this research. Therefore, informed consent was not required.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors upon request.

Acknowledgments: The authors would like to acknowledge the financial support from QNRF, administered by Qatar University, Doha, Qatar.

Conflicts of Interest: The authors declare no conflicts of interest.

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