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How Technology Affecting Researchers in the Era of Generative AI

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ABSTRACT

In the rapidly evolving research landscape, generative AI is emerging as a transformative force. This study explores the multifaceted impacts of generative AI on researchers across various disciplines. By automating routine tasks, enhancing data analysis, and generating novel hypotheses, AI tools are significantly boosting productivity and opening new avenues for innovation. However, these advancements also present challenges, including ethical considerations, the need for transparency, and the potential for bias in AI-generated results. Moreover, the integration of AI into research demands the development of new skill sets, presenting both opportunities and risks for researchers. Drawing on recent studies, this article provides a comprehensive overview of how generative AI is reshaping the research landscape and highlights the critical dynamics researchers must navigate in this new era.

KEYWORDS: Technology, Artificial Intelligence, Research, Generative AI

1. Introduction

In recent years, Generative Artificial Intelligence (Gen-AI) has demonstrated unprecedented progress, rapidly becoming a central topic of discussion across both academic[1] circles and the creative industries[2]. Gen-AI is distinguished by its ability to generate content—including text, images, music, and code—reshaping not only the academic[3] research landscape but also revolutionizing approaches to business[4] and healthcare[5].

These technologies are increasingly integrated into scholarly[6] workflows[6], supporting activities such as drafting literature reviews[7], simulating data[8], automating qualitative coding[9], and even contributing to the co-authorship of academic papers[10]. This emerging synergy is prompting academic institutions to reconsider traditional research practices and guidelines, raising critical questions about authorship, originality, and ethical usage[11].

By analyzing how academics are adopting these platforms, we can gain deeper insights into the transformative potential of Gen-AI tools, as well as the challenges[12] and opportunities they present in shaping the future of scholarly research.

2. Methods

This study investigates the application of generative artificial intelligence (Gen-AI) in academic settings using a qualitative approach. Data collection involved compiling a comprehensive corpus of 1,127 open-access, English-language academic articles focused on the use of generative AI.

To ensure a broad and representative dataset, we employed targeted search terms such as "Artificial Intelligence," "Generative Artificial Intelligence," "in research," and "Large Language Model." These keywords were used across several reputable academic indexing platforms and databases, including ProQuest, ScienceDirect, and arXiv.

To support our analysis, we utilized a range of digital tools for data organization and visualization. For reference management and literature organization, we employed platforms such as Mendeley and Zotero, facilitating efficient categorization, citation

tracking, and metadata extraction. For data analysis and visualization, we worked within the Python programming environment, particularly using Jupyter Lab. Specifically, we utilized Pandas for data cleaning and manipulation, Matplotlib for generating detailed visualizations of trends and patterns, and Word Cloud Generator tools to highlight the most frequently occurring terms and themes within the academic articles.

Following the creation of these visualizations, we engaged in collaborative team discussions to interpret the findings, validate observations, and refine insights through peer feedback and multidisciplinary perspectives.

3. Results

In this section, we analyze the frequency and trends of key terms across several major elements of the collected academic articles, focusing on abstracts, journal titles, article titles, and author-provided keywords. By examining these textual elements, we identify recurring areas of interest and emerging research trends within the academic community, with particular attention to terms such as “machine learning,” “language model,” “AI in education,” and “ethical implications.” The findings are presented below, highlighting the most frequently used terms and their relevance within the literature.

3.1 Publication Year

The first step of our analysis involved examining the publication years of the selected articles to understand their temporal distribution. To visualize this data, we constructed a pie chart illustrating the percentage of publications per year.

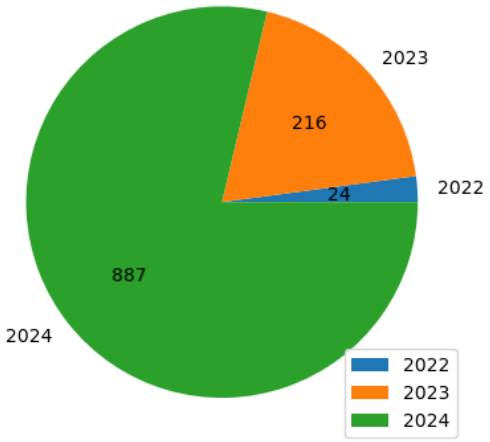


Figure 1. Publication year

From this data, it is evident that the use of Gen-AI in research has experienced significant growth in recent years.

3.2 Journal Title

Next, we analyzed the titles of journals where the selected articles were published. By examining the frequency of individual words appearing in journal names, we aimed to identify disciplinary focuses and recurring research domains. To facilitate this, we generated a word cloud plot that visually represents the most common terms.



Figure 2. Journal title

The top 10 most frequent phrases in journal names were:

1. journal (189)
2. computer (129)
3. international conference (124)
4. artificial intelligence (71)
5. heliyon (64)

6. science (63)
7. research (54)
8. education artificial (50)
9. international journal (48)
10. engineering (47)

This analysis reveals a strong concentration of research within computer science and AI fields, as indicated by the high frequency of terms like "computer," "engineering," and "artificial intelligence." However, the presence of multidisciplinary outlets such as Heliyon suggests a broadening scope across other scientific domains.Unsurprisingly, the most frequently occurring term is “journal” (189), which reflects the standard naming convention of academic publications. While this term on its own is general, its high frequency confirms that the majority of sources are peer-reviewed journals rather than conference proceedings, blogs, or informal publications.

The term “computer” (129) ranks highly, pointing to the strong representation of publications within the field of computer science, which serves as the foundational discipline for AI research. The phrase “international conference” (124) also features prominently, indicating that conference proceedings remain a significant outlet for cutting-edge and timely research in this rapidly evolving field. Conferences such as those related to AI, machine learning, and natural language processing often serve as key platforms for initial dissemination of findings before journal publication.

“Artificial intelligence” (71) further confirms that many of the articles are appearing in AI-focused journals or proceedings, reinforcing the specialized nature of much of this work. Interestingly, “Heliyon” (64)—a multidisciplinary open-access journal—stands out as a specific title, suggesting that generative AI research is also being published in broader, cross-disciplinary outlets that support open science. Similarly, “science” (63) and “research” (54) point toward high-level, possibly interdisciplinary journals or those with a focus on scientific advancement across fields.

The appearance of “education artificial” (50) is notable, likely coming from education-focused journals that are increasingly engaging with how AI technologies, especially tools like ChatGPT, are impacting teaching, learning, and academic integrity. Finally, “international journal” (48) and “engineering” (47) suggest that the scope of generative AI extends well into international and engineering-focused publications, showing its integration into practical, technical, and applied domains.

Overall, this analysis reflects a rich and diverse publication landscape for generative AI research, with strong roots in computer science and AI, but growing reach into interdisciplinary, educational, and engineering contexts. It also highlights the role of both traditional journals and conferences in shaping the current discourse.

3.3 Article Title

To gain further insights into the thematic focus of the collected literature, we analyzed the article titles by generating a word cloud based on term frequency.



Figure 3. Articles title

The top 10 most frequent phrases identified were:

1. artificial intelligence (456)
2. based (152)
3. language model (143)

4. ai (137)
5. large language (135)
6. using (103)
7. chatgpt (98)
8. model (92)
9. application (82)
10. analysis (74)

An analysis of the most frequently occurring phrases in the titles of the collected journal articles reveals clear patterns in the academic discourse surrounding generative artificial intelligence. The phrase “artificial intelligence” dominates the dataset with a frequency of 456, highlighting its central role as the foundational concept under which various subtopics are discussed. Closely following are terms like “based” (152) and “using” (103), suggesting that many studies emphasize methodologies or technologies built on AI frameworks or focus on the practical application of AI systems. The prominence of “language model” (143) and “large language” (135) reflects the strong influence of transformer-based models such as GPT, which have become core components of recent AI advancements. The terms “AI” (137) and “ChatGPT” (98) indicate the growing popularity and recognition of these tools by name, with ChatGPT in particular emerging as a notable focal point in academic titles. Additionally, words like “model” (92), “application” (82), and “analysis” (74) show a balanced interest in both the theoretical construction and practical deployment of AI systems, as well as the evaluative or analytical work being conducted around them. Overall, the frequent appearance of these phrases suggests that current research in this area is heavily centered on exploring the capabilities, implementations, and impacts of large language models, especially within applied and methodological contexts.

3.4 Keywords

In addition to analyzing article titles, we examine the author-provided keywords to further explore the core themes and research areas addressed in the literature. To visualize the most frequently occurring terms, we generate a word cloud based on the frequency of keyword usage across all articles. This visual representation allows for the identification of prominent topics and emerging trends, offering a complementary perspective to the analysis of article titles and enhancing our understanding of the thematic landscape within the body of research.

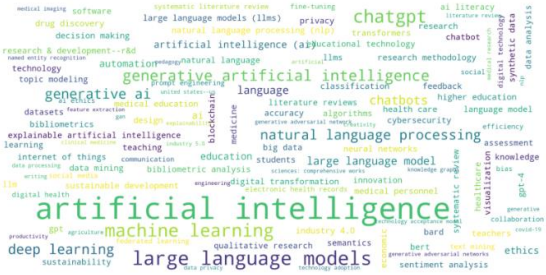


Figure 4. Keywords

The 10 most frequent keywords were:

1. artificial intelligence (535)
2. large language models (151)
3. machine learning (130)
4. chatgpt (123)
5. generative artificial intelligence (87)
6. deep learning (76)
7. natural language processing (69)
8. generative ai (67)
9. chatbots (59)
10. large language model (47)

The keyword analysis reveals a strong concentration on foundational and emerging technologies in the field of artificial intelligence. Leading the list is “artificial intelligence” (535), which serves as an umbrella term encompassing a wide range of subfields, signaling its continued importance as a core descriptor in academic research. Following closely is “large language models” (151), reflecting the increasing academic

interest in architectures like GPT and BERT that are capable of generating human-like text and understanding context at scale. Similarly, “machine learning” (130) and “deep learning” (76)—two foundational AI techniques—remain prominent, underscoring their persistent relevance in the development and operation of generative systems.

The appearance of “ChatGPT” (123) among the top keywords points to the specific interest in OpenAI's model as both a subject of study and a practical tool being integrated into various domains. The presence of both “generative artificial intelligence” (87) and its shorter form “generative AI” (67) suggests some variation in terminology across articles, though both clearly indicate a focus on content-creating AI systems. “Natural language processing” (69) shows continued interest in the linguistic capabilities of these models, while “chatbots” (59) reflect practical implementations of generative AI in user-facing applications. Finally, “large language model” (47)—a singular version of the plural second-ranked phrase—again points to slight variations in phrasing but confirms the same conceptual focus.

Collectively, these keywords reveal a scholarly ecosystem that is deeply engaged with the technical foundations, capabilities, and applications of generative AI, especially as they relate to language and human-computer interaction. The dual appearance of both general (e.g., "artificial intelligence") and specific (e.g., "ChatGPT") terms suggests that researchers are framing their work to appeal to both broad and targeted audiences within the field.

3.5 Abstract

Building upon the previous analyses, we apply the same methodological approach to the abstract of the articles in order to uncover common linguistic patterns and recurring themes. By extracting and analyzing the most frequently used words within the abstract of the articles, we aim to identify dominant concepts, terminologies, and areas of emphasis that characterize the discourse within the field. A word cloud is generated to visually represent these high-frequency terms, with word size corresponding to their frequency of occurrence.



Figure 5. Article abstracts

Top 10 phrases found in abstract are shown bellow.

1. artificial intelligence (1319)
2. research (1197)
3. ai (1145)
4. model (903)
5. data (787)
6. study (652)
7. chatgpt (592)
8. using (559)
9. use (550)
10. method (549)

The frequency of phrases found in the abstracts offers a broader view into the central themes, purposes, and methodologies of the academic literature on generative artificial intelligence. Leading by a significant margin is “artificial intelligence” (1319), reaffirming its position as the primary conceptual framework within which these studies are situated. The word “research” (1197) ranks second, highlighting the strong emphasis on scholarly inquiry, experimentation, and the expansion of knowledge within the AI domain. Similarly, “AI” (1145)—a more concise and frequently used abbreviation—

shows that while formal terminology is common, authors often adopt more accessible language to streamline communication.

The frequent use of "model" (903) reflects a heavy focus on the design, evaluation, and adaptation of computational models, particularly those related to language processing and generation. Terms like "data" (787) and "method" (549) further emphasize the empirical and methodological nature of these studies, where structured datasets and clearly defined procedures are fundamental components of AI research. The presence of "study" (652) and "use" (550) also points to a practical orientation in many articles, as researchers not only explore theoretical aspects but also examine real-world applications and implications.

"ChatGPT" (592) once again appears prominently, underscoring its growing influence as a focal point of analysis, whether as a tool, a case study, or an example of generative model capabilities. Lastly, the phrase "using" (559) reinforces the notion of implementation—how tools, models, or frameworks are being employed in various domains or experiments.

Overall, the abstracts reveal a balance between theoretical exploration and applied research, with consistent attention to AI models, methodological rigor, and real-world usage. The dominance of phrases like "research," "study," and "method" also suggests that much of the literature is grounded in academic and scientific inquiry, aiming to both understand and advance the field.

4. Discussion

The analysis of the most frequent terms across journal titles, article titles, keywords, and abstracts provides a comprehensive view of how generative artificial intelligence (Gen-AI) is framed, studied, and disseminated within academic research. Across all four categories, consistent patterns emerge, revealing not only thematic focuses but also the evolving language and orientation of the field.

First and foremost, the term "artificial intelligence" consistently ranks at the top across all datasets—dominant in article titles (456 mentions), keywords (535 mentions), and abstracts (1319 mentions), and present in journal titles (71 mentions). This reflects the centrality of AI as the conceptual foundation that unites a diverse range of subtopics, including large language models, generative systems, and domain-specific applications. The frequent co-occurrence of terms such as "machine learning," "deep learning," and "natural language processing" further highlights the strong technical underpinnings of the research.

A recurring focus on large language models (LLMs) and ChatGPT is also evident, particularly in article titles, keywords, and abstracts. Terms like "language model" (143 mentions in titles), "large language models" (151 mentions in keywords), and "ChatGPT" (appearing in titles, keywords, and abstracts) suggest that transformer-based models and specific tools like ChatGPT are central points of academic inquiry. This highlights both technological specificity and real-world applicability, indicating that researchers are deeply engaged with the practical capabilities and implications of these models.

Moreover, the frequent use of terms such as "model," "data," "using," and "application" emphasizes a methodological and applied focus. Scholars are not only theorizing about AI but also actively building, testing, and deploying models in diverse research settings. Terms like "study" and "method" indicate a rigorous academic approach grounded in empirical research.

When examining journal titles, the prominence of terms like "computer," "engineering," and "science" reveals a strong concentration of research within technical and STEM fields. However, the appearance of multidisciplinary platforms such as Heliyon,

and terms like "education artificial," suggests an expansion of Gen-AI research into areas such as education, ethics, and cross-disciplinary studies. This indicates that the influence of Gen-AI is spreading beyond traditional technical disciplines into broader societal contexts.

Interestingly, slight variations in phrasing are evident across different contexts—for example, "generative artificial intelligence" versus "generative AI," and "artificial intelligence" versus "AI." These differences reflect varying levels of formality and target audiences, with more formal expressions often appearing in structured contexts like abstracts and keywords.

Overall, the findings indicate a vibrant and rapidly maturing research field. It is characterized by a shared vocabulary centered on artificial intelligence, a growing specificity around particular tools such as ChatGPT, and a strong alignment with technical and applied research methodologies. At the same time, the field is branching into interdisciplinary territories, signaling increasing societal interest and academic curiosity about the real-world implications of generative AI.

Additionally, our findings highlight a clear pattern: Gen-AI is primarily employed as an analytical tool across different fields rather than solely as a theoretical subject. This is evidenced by the frequent use of terms like "using," "based," and "application," reflecting a pragmatic approach where Gen-AI is actively applied to solve real-world research problems.

At the same time, ethical concerns[13] such as bias[14], misinformation[15], sustainability[16], accuracy[17], and data privacy[18] are beginning to emerge alongside the technical discourse. Although these considerations are less dominant in raw frequency counts, their presence suggests a parallel, maturing conversation about the responsible deployment of Gen-AI systems. Researchers are increasingly aware that advancing technological capabilities must be accompanied by critical reflection on their societal impacts.

Taken together, these insights portray a research landscape that is both technically driven and ethically attentive: rooted in innovation, yet conscious of the broader responsibilities it entails. The dual trajectory of Gen-AI research—combining pragmatic application with normative inquiry—underscores the complexity and significance of this rapidly evolving field.

5. Conclusion

This study set out to explore how generative artificial intelligence (Gen-AI) is being employed within academic research. By systematically analyzing journal titles, article titles, keywords, and abstracts, we mapped not only the prevalence of Gen-AI across different disciplines but also the evolving language framing its application. Our multifaceted approach—combining frequency analysis, word clouds, and thematic interpretation—provided a comprehensive view of both the technological foundations and the broader scholarly discourse surrounding Gen-AI.

Our findings reveal that Gen-AI is most heavily adopted within technology-oriented research, followed by emerging applications in fields such as education and healthcare. In technological domains, researchers predominantly utilize Gen-AI as an analytical tool, focusing on the development, testing, and refinement of models on domain-specific datasets. In the education sector, Gen-AI is explored for applications such as automated feedback and personalized learning, while in healthcare, it supports diagnostic processes and patient-centered innovations.

Across all sectors, however, a clear duality is evident: alongside the enthusiasm for innovative deployment, scholars express concern about ethical issues, including bias, misinformation, sustainability, accuracy, and

data privacy. Although these normative considerations appear less frequently than technical discussions, their presence signals a maturing research field increasingly attentive to the societal implications of Gen-AI technologies.

Nevertheless, our analysis has certain limitations. Notably, the geographic and cultural contexts of the research are underexplored, as we did not examine the authors' countries of origin. This gap limits our understanding of how regional priorities and perspectives might shape Gen-AI research agendas. Furthermore, the predominance of English-language and STEM-focused journals in our dataset potentially overlooks contributions from non-English sources and disciplines such as the social sciences, humanities, and policy studies.

To address these limitations, future research should incorporate metadata related to author affiliations and national contexts, enabling comparative analyses across regions. Expanding the corpus to include multilingual sources and a broader range of scientific disciplines would also enrich our understanding of how Gen-AI is conceptualized and applied worldwide. Such efforts will ensure that the evolving discourse around generative AI reflects a truly global, interdisciplinary perspective.

Open data

Data used in this research can be found in https://git.waf.or.id/dhimas/how-gen-ai-affects-researchers

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