



Generative AI in Research:

A Practical Guide for Universities on
Balancing Risks and Benefits



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The ChatGPT Guide was published in October 2023 and is based on GPT-3.5, the latest free version available at the time. It contains independent views and opinions of the authors. We recommend readers to follow latest relevant guidelines to comply with ethical use of generative AI or GPT.

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Objective of the Guide

Artificial Intelligence (AI) has been in the global spotlight with the increased accessibility of ChatGPT and other generative AI tools. While the academic community remains apprehensive about generative AI usage in research, its usage continues to impact the academic research and writing processes.

Consequently, it becomes essential for universities, professional organizations, and publishers to establish clear and detailed policies to embrace AI responsibly.

Enago has curated this comprehensive guide with the following objectives:

1. Outline the benefits and risks associated with ChatGPT
2. Discuss potential use cases in education and research
3. Guide universities and institutions in setting effective policies for generative AI use

This guide aims to **equip decision-makers** with a **balanced and informed approach** to **integrating generative AI technologies** responsibly in education and research settings.



ChatGPT's Capabilities and Limitations

Let's quickly understand some of ChatGPT's capabilities and limitations at the time this guide was written:

Capabilities of ChatGPT



Multi-turn Contextual Text Generation

ChatGPT excels at generating human-like text responses. More importantly, it can provide informative and contextually relevant answers to various prompts. It allows users to specify desired formats, such as bullet points or code snippets, giving control over the presentation of generated text.



Enhanced Context Handling

Users can provide a system message to guide the model's behavior throughout the conversation, enabling more structured interactions. It also supports interactive and dynamic conversations, allowing users to engage in back-and-forth exchanges with the model.



Expanded Language Support

ChatGPT can converse in multiple languages, facilitating global accessibility and communication. However, the text generation in non-popular languages may be limited by lack of extensive training data.



Limitations of ChatGPT (1/2)



Limited Domain Understanding

ChatGPT struggles with domain-specific nuances, requiring caution in interpreting its responses for complex academic research.¹ Validation by domain experts is essential.



Lack of Source Evaluation

ChatGPT lacks the ability to assess sources or verify facts, and its opaque responses make it hard to understand its reasoning or identify citations.



Misinformation Risk

ChatGPT's training data also included unreliable and inaccurate information sources.¹ This can lead to propagation of misinformation within its responses.



Potential Biases in Training Data

The training data also contains biased information (such as underrepresentation of women in research).² Thus, societal and cultural stereotypes may affect ChatGPT's responses.



1. Sabzalieva E, Valentini A. ChatGPT and artificial intelligence in higher education: quick start guide (2023) [Internet]. UNESCO International Institute for Higher Education in Latin America and the Caribbean [cited 2023 April 28]. Available from: <https://unesdoc.unesco.org/ark:/48223/pf0000385146.locale=en>
2. Open AI. How should AI systems behave, and who should decide? (February 16, 2023) [Internet]. Open AI. [cited 2023 August 28]. Available from: <https://openai.com/blog/how-should-ai-systems-behave>

Limitations of ChatGPT (2/2)



Repeating and Reusing Existing Data (or Regurgitated Content):

ChatGPT recycles information as it creates responses based on statistical probabilities of which word may appear next. So, it may produce the text with different words without changing the essence of the response. This may limit innovation, advancements, creativity, and originality.

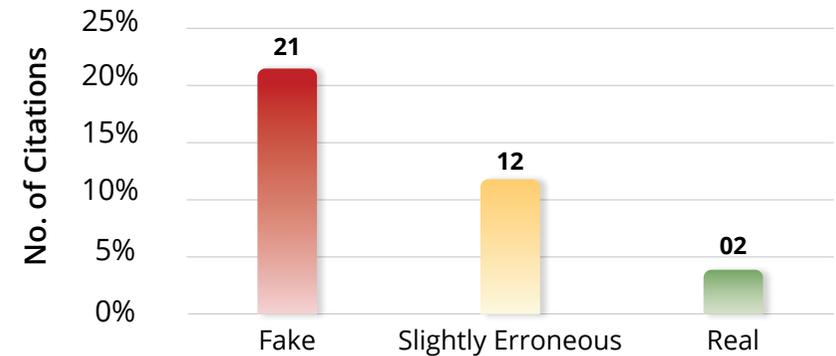


Imaginative but Inaccurate Output (or Hallucinations):

ChatGPT sometimes generates responses that seem plausible but are factually wrong or unrelated to the context. These hallucinations are often a result of training data biases, a lack of real-world comprehension, and the AI model's technical limitations.³ When addressing unfamiliar topics, it tends to provide inaccurate responses.

Did you know?

In March 2023, a group of researchers assessed if ChatGPT could reliably generate accurate references for literature searches.⁴ Out of the 35 citations provided by ChatGPT, only 2 were accurate references.



3. Gungor A. ChatGPT: What are hallucinations and why are they A problem for AI systems [Internet]. Bernard Marr. 2023 [cited 2023 May 23]. Available from: <https://bernardmarr.com/chatgpt-what-are-hallucinations-and-why-are-they-a-problem-for-ai-systems/>

4. McGowan A, Yunlai G, Dobbs M, Shuster S, Cotter M, Selloni A, Goodman M, Srivastava A, Cecchi GA, Corcoran CM. Psychiatry Research. 2023;326:115334. Available from: <https://doi.org/10.1016/j.psychres.2023.115334>

High-Risk and Safe Applications of ChatGPT and Other Generative AI Models (1/2)

We provide below a summary of use cases provided to help researchers and educators in making informed decisions about the application of ChatGPT and other generative AI models:

Conducting Research

Stage of Research and Writing	 Safe Applications	 High Risk
 Hypothesis Generation	Initial research idea discovery or inspiration for new avenues	Full hypothesis generation, as ideas may be incomplete, plagiarized or outdated
 Research Design	Refining research design for enhanced clarity and coherence	End-to-end experimental design due to potentially impractical or biased recommendations
 Literature Review & Meta-analysis	Automation of vast information search and statistical data analysis	Unauthorized use of copyright data or falsification of data sources to support study results
 Summarization	Extraction of key points for quick review	Oversimplification and non-contextual summarization of complex research findings
 Data Interpretation	Generation of initial hypotheses or identification of data patterns	Misinterpretation of complex datasets without context

Note: Since there are already established low-risk applications of generative AI such as writing emails, essays, application letters, and so on, they are not added in here.

High-Risk and Safe Applications of ChatGPT and Other Generative AI Models (2/2)

Academic Writing, Editing, and Publishing

Stage of Research and Writing	 Safe Applications	 High Risk
 Manuscript Writing	Generation of titles and keywords, and structuring the research outline	Generation of results and discussion prompting misleading conclusions
 Language Translation	Aids with specific vocabulary and expressions	Translations may lack precision due to language complexity and cultural references
 Plagiarism Checker and Paraphrasing	Assists with rewording of sentences or checking for verbatim text copy	Unintentional plagiarism if the output closely resembles the original text
 Reference Management	Basic guidance on how to format and structure citations	May not align with specific citation styles or the guidelines provided by journals or academic institutions
 Grammar Check and Editing	Correction of basic grammar and syntax errors in large amounts of text in less time	Inadequate compliance with academic requirements, fact-checking, and understanding discipline-specific terms
 Journal Finder	Find a wide range of journals on broader subjects	Overlook relevant publishing opportunities and ignore key factors influencing journal selection process
 Peer Review	Identification of typical language and grammar errors	No subject matter expertise and inability to address ethical considerations

Potential Negative Consequences for an Organization/Institution

ChatGPT's capabilities seem to tempt users to rely heavily on its responses without conducting thorough evaluations. This can inadvertently lead to the dissemination of plagiarized content or neglect of proper attribution and citation practices. Preventing these issues demands rigorous policies: validating outputs, correcting biases, upholding legal and ethical norms, and balancing AI with human expertise.

■ Threat to Critical Thinking

Overreliance on ChatGPT or similar AI systems without human oversight may erode expertise and judgment, impairing research quality and tarnishing reputation.

■ Risk of Publishing Inaccurate or Misleading Information

ChatGPT may generate responses that are factually incorrect or misleading, in reasonable, confident tones. Relying on such outputs without proper verification can harm the credibility of the organization.

■ Perpetuation of Biased Content

The responses can be biased and potentially increase existing societal biases. If unaddressed, this can cause reputational damage to the organization by inadvertently propagating such biased content.

■ Legal and Compliance Issues

ChatGPT may produce unlawful content or make unsubstantiated claims. Failure to recognize and rectify such outputs can risk legal consequences and financial losses.

■ Privacy and Data Security

Inadequate data protection measures in the system could expose confidential information, compromising the privacy and security of individuals or the organization.



Reported Risks of Using ChatGPT

Questions of Accountability and Intellectual Ownership

ChatGPT, like other AI algorithms can create new inventions or products, leading to questions about who owns the intellectual property rights. Researchers must ensure that they have the legal right to use the AI technologies they employ. The accountability for ChatGPT's output rests with its users.⁵

Ethical Concerns

Any data users add into prompts for ChatGPT are stored in its dataset; this poses ethical concerns as users may add confidential and sensitive information. A particularly concerning areas of use is the integration of ChatGPT or generative AI in healthcare. For example, the use of generative AI in a mental health app has already drawn intense scrutiny. Medical applications will require stricter adherence to informed consent laws and ethical guidelines to protect users' rights and privacy.⁶

Did you know?

Several organizations and publishers have already restricted the addition of AI as an author, reiterating that researchers must take full ownership of their work.⁶

nature

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EDITORIAL | 24 January 2023

Tools such as ChatGPT threaten transparent science; here are our ground rules for their use

As researchers dive into the brave new world of advanced AI chatbots, publishers need to acknowledge their legitimate uses and lay down clear guidelines to avoid abuse.

Source: [nature.com](https://www.nature.com)

5. Tsigaris P, Teixeira da Silva JA. The role of ChatGPT in scholarly editing and publishing. Eur Sci Ed [Internet]. 2023 [cited 2023 May 15];49:e101121. Available from: <https://ese.arphahub.com/article/101121/list/8/>
6. Quarles S. Online mental health company uses ChatGPT to help users respond to experiment - raising ethical concerns [Internet]. Business News. 2023 [cited 2023 Jul 20]. Available from: <https://biz.crast.net/online-mental-health-company-uses-chatgpt-to-help-users-respond-to-experiment-raising-ethical-concerns-around-healthcare-and-ai-technology/>

Guiding Principles for Framing Policies for AI Use in Academia

While it is difficult to provide a universally applicable blueprint for developing policies related to AI use in research, administrators should consider some key principles that can be adapted to fit each institution's need. These principles will allow implementation of a standardized approach to defining an achievable policy and set the trajectory of AI integration at the organizational level.

These principles cover crucial steps in ensuring a successful policy as follows:

1. Define the **scope of AI adoption** on where, when, and how AI use is allowed for all educational or research activity.
2. **Establish ethical guidelines** based on existing frameworks. Provide access to ethics committees.
3. Identify and **plan for IT and non-IT support**, including data storage, validation tools, access to funding.
4. **Assign points of contact** for information as well as for reporting and investigating misuse.
5. **Consult diverse stakeholders**, including researchers, AI ethicists, funders and public representatives while policy building.
6. **Communicate transparently** and avoid grey areas in policies for users.
7. Adopt a culture of **continuous learning and training** to stay updated with the latest technology and ethics in AI research.

These guiding principles can serve as a foundation for developing comprehensive policies that address ethical, technical, and social considerations, while also fostering responsible and innovative AI research practices.



Recommendations to Ensure Ethical and Responsible AI Use in Research (1/2)

Re-think Performance Evaluations

Personalize assignments and diverse assessment formats

Create individualized assignments, making it challenging for students to utilize AI-generated model answers. Integrate various assessment types such as handwritten essays, in-person discussions, oral presentations, and hands-on projects. This diversity reduces students' reliance on AI-generated responses.

Provide timely and constructive feedback

Build open lines of interaction and approachability with students. Offer feedback on assignments promptly, allowing students to improve their work and learn from mistakes. This feedback loop discourages cheating by highlighting the significance of authentic effort and learning.

Facilitate Ethical AI Usage

Leverage technology to detect plagiarism

Utilize plagiarism detection software to identify instances of copied or AI-generated content in student assignments. These tools act as deterrents and help identify potential cheating cases.

Ensure informed consent

Establish protocols to obtain informed consent from participants involved in AI-enabled research, ensuring they are aware of the data collection, usage, and potential implications.

Secure data protection

Implement robust data security measures to safeguard sensitive and confidential information, adhering to relevant privacy regulations and industry best practices.

Broaden Research Strategies

Encourage interdisciplinary collaboration

Foster partnerships between AI experts and domain-specific researchers to ensure AI technologies are applied appropriately and effectively in research projects.

Establish clear objectives

Clearly define the goals and intended outcomes of AI implementation in research to guide decision-making. Ensure alignment with ethical considerations for handling sensitive data, and medical information.

Establish validation procedures

Implement mechanisms for independent validation and verification of AI-generated outputs to ensure accuracy, reliability, and mitigate the risks of misinformation.

Recommendations to Ensure Ethical and Responsible AI Use in Research (2/2)

Establish Training Programs

AI literacy

Regularly assess AI use in research for impact, effectiveness, and policy adherence. Additionally, provide training on AI technologies, limitations, risks, and ethics to researchers, faculty, and staff.

Ethical awareness

Foster a culture of ethical awareness and responsible AI use by promoting discussions, workshops, and seminars on AI ethics and responsible research practices.

Strengthen Compliance Measures

Facilitate ethical integration

Create policies that outline ethical principles and standards for AI usage, emphasizing fairness, transparency, and accountability. Expand review boards to evaluate AI-based research proposals, ensure compliance, and provide guidance.

Data governance and access

Define protocols for data sharing, access, and storage, ensuring legal and ethical compliance while protecting intellectual property rights.

Did you know?

Although many universities have developed policies to regulate AI use, very few have a definite stand for research and academic writing. Our analysis of the policies set up by top 25 universities (QS Rankings 2023) highlights the need for standardizing key components to be considered when establishing such guidelines.

Established University Policies on AI Usage in Educational and Research Activities

By : Uttkarsha Bhosale | Dr. Gayatri Phadke

Sep 28, 2023 < 1 min read



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Concluding Remarks

The limitations of generative AI do create opportunities for inaccurate and fake research; however, universities should not expect individual researchers to completely avoid this technology in light of its widespread use. Instead, institutions can focus on setting well-defined guidelines that outline requirements, workflows, and set up regulations to ensure responsible AI use.

Utilizing ChatGPT and other generative AI tools will require continuous attention and adherence to evolving AI guidelines. Our key recommendations are as follows:

1. **Continuous Vigilance:** Generative AI technology evolves through ongoing training and optimization. It is crucial to remain vigilant and up-to-date with AI advancements and best practices.
2. **Human Expertise is Invaluable:** In complex domains like academic research and writing, generative AI cannot replace human skills and expertise. While AI accelerates processes, it poses risks to research integrity and scholarly reputation.
3. **Safeguarding Research Integrity:** To safeguard the credibility and reputation of institutions, it's imperative to recognize their limitations and plan ahead.

To achieve this, university administrators could utilize a four-step process process for setting up sustainable policies:



AI Solutions With Enago

Enago is here to support your journey with AI and help you implement the right solutions.

- **Advisory and Consulting Service**

Our AI consultants can help you identify the right use cases as well as provide you a clear forward-looking direction for your Gen AI needs, keeping in mind your strategic goals.

- **AI powered Writing and Reading Assistant**

Our AI-powered Writing and Reading Assistant, Trinkka AI and Enago Read, provide a comprehensive solution to researchers, helping them be more efficient and productive.

- **Publication Optimization**

Enago Reports is a one-stop solution to ensure superior language quality, technical compliances, eliminate bias, automatically proofread, facilitate journal submission, and identify plagiarism or AI-generated content.

- **Education and Training Solutions**

We provide personalized training on use of generative AI to upskill users so that they are more effective.

Control the future of knowledge creation and dissemination with smart AI solutions that redefine the boundaries of what's possible in the world of academia.

Reach out to us for a personalized exploration of AI solutions.

Email: partnership@enago.com



Appendices

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Brief Introduction to ChatGPT

ChatGPT is an advanced large language model developed by OpenAI, trained on all freely-available internet sources until September of 2021.^{1*} Its generative pre-trained transformer (GPT) models were trained to analyze patterns, relationships, and context within this immense training data. Responses by ChatGPT are the result of statistical patterns and associations within that data, rather than a direct experience from the physical world.² Essentially, the model predicts the most likely words or sentences that should follow, by making educated guesses based on the statistical patterns learned from the training data.

ChatGPT created a buzz due to its user experience and functionality:

1. Generation of human-like, coherent, and contextually relevant responses
2. Easy-to-use chat interface where a text “prompt” can be input
3. Fine-tuning capabilities that enable development of targeted applications

**OpenAI introduced web browsing in GPT-4.0 for Plus and Enterprise users in late September, thereby eliminating the knowledge cutoff limitation. However, this is currently not accessible in the free version.*

1. Researchgate.net. [cited 2023 May 3]. Available from: https://www.researchgate.net/publication/369812340_Chapter_2_ChatGPT_in_Academic_Writing_and_Publishing_A_Comprehensive_Guide
2. Torres JL. Tec de Monterrey recomienda a su comunidad uso inteligente de ChatGPT [Internet]. Tec.mx. [cited 2023 May 11]. Available from: <https://conecta.tec.mx/es/noticias/nacional/institucion/tec-de-monterrey-recomienda-su-comunidad-uso-inteligente-de-chatgpt>



Ongoing Legal Concerns Around ChatGPT and Other Generative AI Tools (1/2)

Lack of transparency in the training data used for generative AI tools and their capability to generate human-like text has raised concerns from multiple fields about potential violations of academic integrity policies in non-academic writing and research reporting.

1. Nature Prohibits the AI-generated images or Videos:

Nature journal has made the decision to refrain from publishing visual content sourced from generative AI applications, such as photography, videos, or illustrations, due to concerns regarding integrity, attribution to original sources, consent for re-use of copyrighted materials, and privacy.³ Nature will, however, allow the incorporation of AI-assisted text, provided appropriate acknowledgments are made and sources are provided.

2. That's a No to Using Generative AI for Peer Review, say Funding Agencies:

Funding agencies like the National Institutes of Health (NIH) and the Australian Research Council (ARC) are banning the use of generative AI tools for peer-review of grant proposals.⁴ Primary concerns include confidentiality, errors in identifying novelty, bias, lack of creativity, and accountability. The use of AI-written reviews could also compromise originality of thought, lead to generalized feedback, and even constitute plagiarism.



3. Nature Editorials. Why Nature will not allow the use of generative AI in images and videos [Internet]. Nature. Vol 618, 8 Jun 2023 [cited 2023 July 28]. Available from: <https://www.nature.com/articles/d41586-023-01546-4>

4. Kaiser J. Science funding agencies say no to using AI for peer review [Internet]. ScienceInsider. 14 Jul 2023 [cited 2023 July 28]. Available from: <https://www.science.org/content/article/science-funding-agencies-say-no-using-ai-peer-review>

Ongoing Legal Concerns Around ChatGPT and Other Generative AI Tools (2/2)

3. **Class Action Lawsuit Against OpenAI and Microsoft for Disregard of Privacy:**

A lawsuit against OpenAI and Microsoft claims that several generative AI products such as ChatGPT, Dall-E, and Vall-E involve the unauthorized scraping of personal data.⁵ Claims include past and continued use of private and personally identifiable information, from millions of internet users, including children, without their consent or knowledge. Furthermore, the lawsuit claims that such breach of privacy has increased since OpenAI became a for-profit business.

4. **Renowned Authors Write an Open Letter for Protection of Their Content Rights:**

Nearly 8000 prominent writers (including Nora Roberts, Viet Thanh Nguyen, Michael Chabon, and Margaret Atwood) urge AI companies to stop using their work in the training data with explicit permission or defined compensation in a recently published letter as concerns grow about an impingement on writers' livelihood.⁶ Text-based generative AI applications, which scrape authors' content and could generate new content in their writing styles, has heightened these concerns.

5. **AI Detection Tools Found Biased Against Non-native English Writers:**

As AI tools have gained popularity, so have AI detection tools. While relying solely on generative AI detectors to identify instances of academic misconduct is not recommended, they are anticipated to assist in flagging potential issues. However, a recent study calls into question the fairness and robustness of such tools as some GPT detectors misclassified non-native English writing as AI generated.⁷ It is essential to address the biases in these detectors to avoid marginalizing and perhaps even penalizing non-native English speakers as publishers and educators may look to increase implementation of such detection tools.



5. Hill C. OpenAI and Microsoft face class action lawsuit for allegedly violating copyright and privacy laws [Internet]. Legal IT Insider. 29 Jun 2023 [cited 2023 July 28]. Available from: <https://legaltechnology.com/2023/06/29/openai-and-microsoft-face-class-action-lawsuit-for-allegedly-violating-copyright-and-privacy-laws/>

6. Knight L. Authors call for AI companies to stop using their work without consent [Internet]. The Guardian. 20 Jul 2023 [cited 2023 July 28]. Available from: <https://www.theguardian.com/books/2023/jul/20/authors-call-for-ai-companies-to-stop-using-their-work-without-consent>

7. Liang W, Yuksekgonul M, Mao Y, Wu E, Zou J. GPT detectors are biased against non-native English writers. Patterns, 4(7), 100779, 2023. <https://doi.org/10.1016/j.patter.2023.100779>

Comparative Example of AI-assisted and Human-assisted Scholarly Editing

While ChatGPT appears to provide well-edited text, its capabilities fall short of the expectation in academic editing. Moreover, expert intervention does improve the text by providing suitable subject-matter specific editing. Aside from being unable to understand technical nuances, generative AI's editing skills have been inefficient at several other important aspects of academic editing, such as comprehending the full scope of academic writing requirements, including context, citation, consistency, tone, logic, clarity, cultural sensitivity, plagiarism detection, subject-specific expertise, and ethical considerations. Read more about this [here](#).

Original Text

In current study we have single stock whose price observe a switching geometric Brownian motion. Also, the stockpay no dividends.

Edited by ChatGPT

In current study, we have a single stock whose price follows a switching geometric Brownian motion. Additionally, the stock pays no dividends.

Edited by a Human (Enago Editor)

~~In current~~ This study ~~we have~~ examines a ~~no-dividend~~ single stock whose prices ~~observe a exhibit regime-~~ switching geometric Brownian motion. ~~Also, the stockpay no dividends.~~

Error Explanation

The human editor combined the two sentences with the use of technical jargon. In contrast, the ChatGPT sentence could not revise “stock pays no dividend” and “switching geometric Brownian motion” to “no-dividend stock” and “regime-switching geometric Brownian motion”, respectively.

Expert Tip

Aside from being unable to understand technical nuances, generative AI's editing skills have been inefficient at several other important aspects of academic research and writing. Please find more examples here: <https://www.enago.com/academy/limitations-of-deep-write-chatgpt-editing/>

Publication-ready Statement

This study examines a no-dividend stock whose prices exhibit regime-switching geometric Brownian motion.

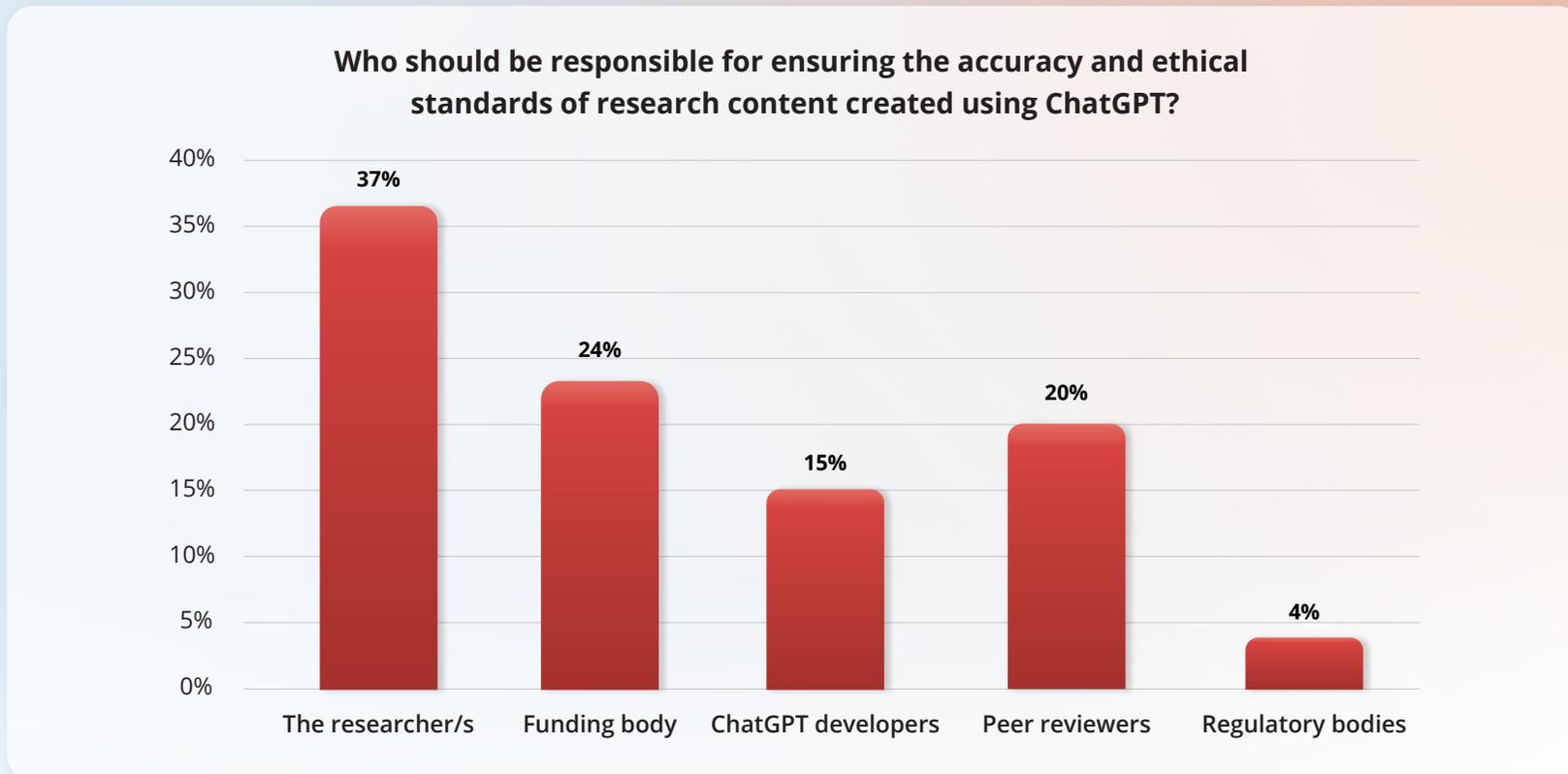
Need for Guidance From Universities: Researchers' perspectives from Enago's poll

Even six months after the disruptive release of ChatGPT, universities are struggling to propose cohesive policies for its usage in research setting. In the meantime, there's a clear need for guidance highlighted from our recent researcher poll.

While a majority of researchers understood individual responsibility, more than 60% researchers held Funding bodies (24%), Peer Reviewers (20%) and even ChatGPT itself (15%) responsible for declaring how to use generative AI responsibly.

Poll details:

1. Survey was conducted on English, Japanese, and Korean websites.
2. Total of 7,748 researchers answered the poll question



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Resources for more information

1. <https://www.enago.com/academy/manuscript-preparation-with-ai/>
2. https://www.iesalc.unesco.org/wp-content/uploads/2023/04/ChatGPT-and-Artificial-Intelligence-in-higher-education-Quick-Start-guide_EN_FINAL.pdf
3. <https://www.enago.com/academy/human-editors-vs-chatgpt-publication-ready-research/>
4. <https://www.enago.com/academy/negative-costs-of-using-chatgpt-to-edit-research-manuscript/>
5. <https://research.aimultiple.com/generative-ai-in-life-sciences/>
6. <https://www.enago.com/academy/why-ai-alone-is-not-enough/>
7. <https://research.aimultiple.com/chatgpt-survey/>
8. https://www.researchgate.net/publication/369359524_ChatGPT_and_AI-Written_Research_Papers_Ethical_Considerations_for_Scholarly_Publishing
9. <https://www.cam.ac.uk/stories/ChatGPT-and-education>
10. <https://axial.acs.org/publishing/ai-in-publishing-the-ghost-writer-in-the-machine>
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