Article:
Mohammadi, E., Thelwall, M. orcid.org/0000-0001-6065-205X, Cai, Y. et al. (3 more authors) (2026) Is generative AI reshaping academic practices worldwide? A survey of adoption, benefits, and concerns. Information Processing & Management, 63 (1). 104350. ISSN: 0306-4573

https://doi.org/10.1016/j.ipm.2025.104350

Information Processing and Management 63 (2026) 104350

Contents lists available at ScienceDirect

Information Processing and Management

journal homepage: www.elsevier.com/locate/infoproman

Is generative AI reshaping academic practices worldwide? A survey of adoption, benefits, and concerns

Ehsan Mohammadi [a,*], Mike Thelwall [b], Yizhou Cai [c], Taylor Collier [a], Iman Tahamtan [d], Azar Eftekhar [a,e]

[a] School of Information Science, University of South Carolina, 1501 Greene St, Columbia, SC 29208, USA
[b] School of Journalism, Media and Communication, University of Sheffield, 2 Whitham Rd, Sheffield S10 2AH, Sheffield, UK
[c] Department of Statistics, University of South Carolina, LeConte College, 1523 Greene St Suite 219, Columbia, SC 29225, USA
[d] University of Tennessee, Knoxville, TN, USA
[e] Department of Psychology, University of South Carolina, Barnwell College, 1512 Pendleton St Room 224, Columbia, SC 29208, USA

ARTICLE INFO

Keywords:
Generative AI
AI in research
AI in teaching
AI in higher education

ABSTRACT

Although generative AI is transforming academic research and education, little is known about the role, gender, international, and disciplinary variations in uptake and use. This 20-country survey of publishing academics shows the widespread awareness and adoption of generative AI tools in academia, but with substantial international and disciplinary differences, and some role and gender differences. In particular, females were 10 % less likely to use Gen AI frequently (daily or weekly) for research, which may exacerbate gender inequalities. Perhaps surprisingly, the highest adoption rates occurred in some non-Western nations, possibly because of a greater need for translation services. The highest awareness is in the social sciences, perhaps because of the greater need for text analysis. Across all groups, these tools were mainly used for academic writing rather than data analysis and support for critical thinking. Despite this, personalized instruction and problem-solving are among generative AI's most generally claimed benefits. However, participants in all groups were skeptical about the creativity, accuracy, and consistency of AI-generated content in academic contexts. The most significant concerns about using generative AI in academia were inaccuracy, plagiarism, discouraging critical thinking, a lack of transparency and explainability, intellectual property rights violations, and data privacy risks. For policymakers, the findings point to fields and countries that may need action to prevent falling behind, as well as the ongoing need to investigate and monitor the impacts of generative AI on research practices.

1. Introduction

Artificial intelligence (AI) tools have become increasingly popular in recent years and especially new large language models (LLMs) like ChatGPT that draw from a huge training corpus. These models engage with users through generating novel outputs and are a type of generative AI (Gen AI). A range of surveys illustrate the growing interest in Gen AI, although all have sampling limitations and

* Corresponding author.
E-mail addresses: Ehsan2@sc.edu (E. Mohammadi), M.a.thelwall@sheffield.ac.uk (M. Thelwall), Yizhouc@email.sc.edu (Y. Cai), tahamtan@vols.utk.edu (I. Tahamtan), Eftekhar@mailbox.sc.edu (A. Eftekhar).

https://doi.org/10.1016/j.ipm.2025.104350
Received 6 February 2025; Received in revised form 5 August 2025; Accepted 6 August 2025

respondents may not understand the questions well. In 2024, over half of U.S. households used AI tools (Aldasoro et al., 2024), a significant shift from 2023, when most Americans reported never having used ChatGPT (Park & Gelles-Watnick, 2023). Similar but uneven trends are seen among professional workers, with those in advertising and technology fields reporting higher usage of AI tools than those in medical, legal, or financial sectors (Barisano et al., 2024; Humlum & Vestergaard, 2024; Otis et al., 2024; Yan et al., 2024). Within academia, a significant increase in the uptake of AI is happening in different areas, roles, and research activities (Bornmann et al., 2024; Erduran, 2023; Kousha, 2024; Lund et al., 2023; Thelwall, 2024). Around 56 % of college students reported using AI tools on assignments and exams, with the highest use in business and STEM fields (Nam, 2023). Post-doctoral researchers reported that AI tools have influenced their research practices, mainly to refine texts and improve or generate code (Lordling, 2023). Adoption has occurred unequally between demographics, however (Glassdoor Economic Research, 2024; Nam, 2023). Attitudes towards AI are generally positive, though Gen AI is still seen as less trustworthy than humans (Aldasoro et al., 2024). Serious concerns have been raised about AI-generated content (Thorp, 2023). These include hallucinations, in which the system produces inaccurate information; plagiarism, involving the use of existing texts without acknowledgment; and embedded biases (Mohammadi et al., 2025), which reflect or reinforce prejudices found in the outputs.

Although the uptake of Gen AI has been extensively analyzed within individual countries and for narrow issues (Abdaljaleel Ada et al., 2024; Bikanga, 2024; Chan & Hu, 2023; Gruenhagen et al., 2024; Wang & Ren, 2024), science is a global network and international comparisons are needed. Nature and Oxford University Press have each published reports on the application of Gen AI in research practices (Naddaf, 2025; Oxford University Press, 2024); but there remains a lack of systematic academic studies that examine the use of Gen AI tools across disciplines in both research and teaching, particularly from international perspectives. Finally, there is little systematic research into the challenges and benefits of Gen AI in academia, and most past studies are exploratory in the sense of being general and seeking descriptive information rather than using a data-driven approach.

This study addresses five research questions that concern different aspects of Gen AI use in academia, focusing on the understudied areas of differences between academic roles, disciplines, genders, and countries. It is important to understand differences in Gen AI uptake in general to get a better picture of how it is changing academia. More specifically, knowledge about differences between roles will help trainers to target resources at those needing it most and will help individual academics to understand the likely different perspectives of others in the system. For example, journal editors (senior role) could benefit from understanding whether Gen AI uptake tends to be greater or lesser for new submitting authors (junior role). Similarly, university trainers might target disciplines that seem not to be benefitting from Gen AI. For gender, since Gen AI seems to be influencing academia widely, it would be useful to know whether this is likely to exacerbate or reduce existing gender inequalities, so that appropriate action, such as training, could be taken. Finally, evidence of international differences in uptake will point to whether Gen AI is likely to be increasing or decreasing the digital divide and enhancing or reducing global fairness in academia, informing initiatives to address these issues.

1. How does the usage of Gen AI in academia vary based on academic roles, disciplines, genders, and countries?
2. How do the primary applications of Gen AI in research differ based on academic roles, disciplines, genders, and countries?
3. How do the key uses of Gen AI in teaching vary between academic roles, disciplines, genders, and countries?
4. How do the advantages of Gen AI in academic settings differ across academic roles, disciplines, genders, and countries?
5. How do the primary concerns regarding using Gen AI in academia differ based on academic roles, disciplines, genders, and countries?

2. Literature review

This section covers GenAI use in both teaching and research, often with overlapping problems.

2.1. Gen AI use in teaching

Students are using AI tools at increasing rates. For example, a commercially-sourced exploratory survey suggested that the adoption of AI tools by UK undergraduates had risen from 66 % in 2024 to 92 % in 2025. The most reported use (64 %) was generating text via tools like ChatGPT (Freeman, 2025). Lecturers have also discovered practical applications of Gen AI in education-related tasks. Instructors at a university in Indonesia, for example, reported many benefits, including gaining insights into new ideas/concepts, expediting aspects of lesson planning and assignment development, and simple tasks such as table creation (Firaina & Sulisworo, 2023). Multimodal tools, like Google Gemini, may give additional capabilities that are particularly useful when working wholly or partly with non-textual data (Imran & Almusharraf, 2024).

Some educators are also actively integrating Gen AI tools into their class assignments. Yang (2023) used ChatGPT in lessons as a tool to help students explore the research process. Specifically, Yang encouraged students to use ChatGPT for research project design and coding assistance for data collected by the students.

Individualized support has been highlighted as a significant benefit to students and educators. This is particularly useful for EFL (English as a Foreign Language) students (Fauzi et al., 2023; Gayed et al., 2022; Perkins et al., 2023; Rahimi & Abidi, 2023; Zhao, 2023) and those needing specialized attention due to a learning disability or neurodivergence (Islam & Islam, 2023; Rahman & Watanobe, 2023). This, in turn, frees up time for educators to focus on other tasks. ChatGPT provides an avenue for significant cognitive offloading for students by assisting with outlines (Firaina & Sulisworo, 2023; Sok & Heng, 2023), editing (Perkins, 2023; Wen & Wang, 2023), and providing feedback before submitting an assignment (Perkins, 2023; Rasul et al., 2023; Sullivan et al., 2023; van Dis et al., 2023). Debugging and code assistance is another common educational use of Gen AI tools (Rahman & Watanobe, 2023; Ray,

2023; Sullivan et al., 2023; Surameery & Shakor, 2023), with Yang (2023) finding ChatGPT to be a useful assistant for his students when using R to analyzing their own data.

There are also benefits for instructors. Gen AI can assist professors with class preparation (Firaina & Sulisworo, 2023), automatically grading assignments (Rasul et al., 2023; Sok & Heng, 2023), and quickly generating visual aids (Firaina & Solisworo, 2023; Sok & Heng, 2023). Professors seeking tenure may see even more benefits such as quickly summarizing lengthy articles (Dergaa et al., 2023), generating abstracts and/or methods sections (Rahman et al., 2023), and assisting with idea formation and creativity when coming up with new research projects (Dergaa et al., 2023; Islam & Islam, 2023; Ray, 2023). The customization features in some Gen AI give educators additional options for creating course-specific assistants for better responses to student questions and grading assignments (OpenAI, 2023b). This feature is set up so that users do not need prior programming knowledge to create specialized chatbots.

Inaccuracies and misinformation are well-known issues with LLMs and are worrying for teaching applications. OpenAI's (2023) technical report acknowledges that hallucinations are a continuing issue with GPT-4, and it is common for other LLMs (Zhu et al., 2024). While researchers and professors have years of experience critically analyzing information, undergraduate students do not. This is particularly concerning as ChatGPT often gives inaccurate responses that sound plausible (Rahimi & Abidi, 2023; Sok & Heng, 2023). Additionally, while LLMs are capable of human-like responses, they often lack context and nuance, which can lead to inaccurate responses (Kalla et al., 2023). This also suggests a need for educators to include the shortcomings of Gen AI when developing content focused on research skills and critical thinking. OpenAI (2023a) has attempted to combat issues of false information and hallucinations through filtering, though they admit that their filtering process has not been comprehensive.

Ethics must be at the root of every discussion about using Gen AI applications in academia. All stakeholders, including students, should be involved in these discussions (van Dis et al., 2023). A blanket ban of Gen AI does not prevent students from using it as there are no tools capable of detecting it 100 % of the time (Liebrenz, 2023; Rahman & Watanobe, 2023; Rasul, 2023; Wen & Wang, 2023). Because of this difficulty, some have suggested rethinking assignments by moving away from papers and tests, instead using collaborative group projects and assignments requiring student collection of data (Sullivan et al., 2023; Yang, 2023). These new approaches may lead to more engaging projects and more equitable learning spaces, as specific student needs can more easily be addressed, such as for English as a Foreign Language students and those requiring accommodations for disabilities.

2.2. Gen AI use in research

Gen AI can support research in various ways, potentially improving efficiency (Yan et al., 2024). Idea generation (Rahman et al., 2023; Sok & Heng, 2023), explanations of new concepts and different approaches for problem solving (Rahman & Watanobe, 2023) are all examples of practical applications of LLMs in the research process. As ChatGPT has extensive training on a variety of texts, it has been suggested that some level of cognitive offloading for editors of academic journals may be possible (van Dis et al., 2023).

Gen AI can also support the writing process. Rahman et al (2023) argued that sections of research papers that do not require citations, such as abstracts, introductions, and methodology, were well suited for support by LLMs as there is no plagiarism concern. However, some Gen AI models cannot cite sources accurately, which may cause problems if they are not checked. An exploration of this issue by Kumar (2023) confirmed that when ChatGPT provides citations, they can be inaccurate. Outside of writing entire reports and smaller sections, Gen AI can be used to assist with pre-writing tasks such as creating outlines (Firaina & Sulisworo, 2023; Sok & Heng, 2023) and translation (Rasul et al., 2023). Gen AI tools also seem to be effective at proof reading, not only checking for grammar and spelling errors but also improving readability (Wen & Wang, 2023). For computing needs, Rahman and Watanobe (2023) found ChatGPT to be able to debug programs, predict bugs, make suggestions for code optimization, and even assist with coding practice.

Plagiarism is an important issue because some researchers have begun using Gen AI as a coauthor. Alser and Waisberg (2023) found that journal articles with ChatGPT listed as an author were flagged by three plagiarism detectors as having between 5 % to 49 % plagiarized content, including phrases copied from Wikipedia. Plagiarism issues with ChatGPT are primarily related to its inability to correctly cite its sources (Dergaa et al., 2023; Dis et al., 2023; Liebrenz et al., 2023; Lund et al., 2023; Ventayen, 2023). Even when ChatGPT does cite information, those citations tend to be incorrect or the sources do not exist (Kumar, 2023; Rahman et al., 2023; Sallam, 2023). Clark et al. (2021), based on asking 780 people, found that text generated by ChatGPT was only recognized as originating from a nonhuman source 58 % of the time for GPT-2 and 50 % of the time for GPT-3. This is particularly concerning for academic institutions as technical solutions are also not able to accurately detect when papers have been generated by ChatGPT (Liebrenz, 2023; Rahman & Watanobe, 2023; Rasul, 2023; Wen & Wang, 2023). Thus, some organizations, such as Elsevier and the International Committee of Medical Journal Editors, explicitly prohibit crediting AI as an author.

Bias is another serious challenge with Gen AI applications. Having a large web-based dataset has led to a continuing issue with a variety of discriminatory biases, such as racism and ableism (Kalla et al., 2023; Lund et al., 2023; Ray et al., 2023). Additionally, there are concerns that LLMs are more prone to the "Mathew Effect" of promoting well-known authors or authors who publish more often in open-access journals than other authors (Lund et al., 2023). While bias can never be entirely removed from any individual or system, it is important to always strive for better neutrality and to be aware of what biases may be present in Gen AI.

3. Methodology

3.1. Survey design

We reviewed the existing literature, policy documents, and news media outlets to identify inclusive aspects of Gen AI and higher

education. In an iterative process, we selected the key themes that needed to be included in the questionnaire. A survey instrument with ten questions was developed and refined through several pilot tests (see the questionnaire in the Appendix). All questions used the phrase "Chat GPT or other generative AI tools" (e.g., "Q2 How often do you use Chat GPT or other generative AI tools for academic purposes?) rather than "Generative AI" or a list of tools (e.g., "ChatGPT, Gemini, Claude, Midjourney, Poe…") for clarity with a wide audience. At the time of the survey, ChatGPT was by far the best-known AI tool, and many researchers may not understand the phrase "generative AI" or how it differs from standard AI. Thus, including the correct phrase with an example was designed to be understandable to academics with differing levels of knowledge. Of course, some respondents may have still misunderstood, such as considering proofreading tools to be generative AI, but it would not be practical to give a detailed tutorial on types of AI to clarify within the context of a survey. This study received institutional review board (IRB) approval from the University of South Carolina and the University of Sheffield.

3.2. Samples and participants

The research design was to generate, as far as possible, a probability sample of currently active researchers in each of 20 countries with large numbers of authors, using 2022 as the index year for being research active. Unfortunately, it was not possible to take a complete or purposive sample of countries since our survey method would probably get too few responses from countries with few publishing researchers. The results therefore are not representative of small countries and developing countries with smaller research bases. The countries with the most authors were selected to give enough authors to sample in each case, and the widest possible coverage of scientific research. These goals mean that the countries selected represent most published academic research but are not representative or countries with few researchers, for which it would be difficult to obtain a large enough number of responses to analyze statistically.

Since there is no source for complete lists of academic emails to sample for surveys, an indirect approach was chosen to select researchers. The target was to get survey responses from 100 academics in each country selected.

This sample size would give a confidence interval for a proportion width of at most 0.196, or just under 20 %, which seems large enough to detect meaningfully large differences between countries. Based on previous experiences with academic surveys (Mohammadi, Thelwall, & Kousha, 2015, 2018) and a belief that ChatGPT would attract more interest than average, we estimated a likely 5 % response rate, so that 2000 emails would need to be sent for each country to achieve 100 responses. The sample was created as follows.

First, all Scopus records for journal articles in 2022 were downloaded using the Scopus API during January and February 2023. From this data, a complete list of the Scopus IDs of all authors listed for all articles from 2022 was made. For each author, the country affiliation was also extracted. This gave a reasonably complete list of currently active scholars who have published at least one Scopus-indexed journal article. Using a random number generator, we then took a probability sample of authors from the 20 countries with the most author IDs. We previously estimated the proportion of authors for whom we could extract an email address (see below) and divided the target sample size by this proportion for each country. For example, for Poland, we estimated that we could get email addresses for 46 % of authors, so we initially sampled 2000/0.46 Polish author IDs to target a final sample of 2000 email addresses.

Since the Scopus API does not report author email addresses, we searched the Scopus web interface for articles by these authors and downloaded their records. These web records contained email addresses only for the corresponding author(s), but these corresponding authors are not matched with author IDs. We judged an email address to be associated with a given author ID when the corresponding author's last name and first initial were the same as the author with the same information. The above procedure extracted between 1888 and 3681 email addresses for the authors, depending on the country. The number of email addresses per country was not precisely 2000 each because the proportions of emails successfully extracted varied from our initial estimates (see Table S1).

3.3. Survey distribution and analysis

The survey was sent to 47,321 potential respondents from 20 countries using Qualtrics, with 40,078 eligible recipients, after accounting for failed, duplicate, bounced, and spam rejection emails between January and March 2024. The overall response rate was 4.30 %, with a participation rate of 9.93 % and a completion rate of 43.29 % (Table S2).

Descriptive statistics for the data collected are reported based on counts and ratios. A Student *t*-test was employed to compare the differences between the means of the two groups. Additionally, ANOVA was used to analyze the squared differences between categories. A Stratified Randomization Test was conducted to assess the significance of the results

4. Results

4.1. Familiarity and usage of Gen AI in academia

Across the 20 countries, publishing authors' awareness of Gen AI tools was high, with 73.1 % having heard "a lot" about them and only 3.4 % indicating no familiarity (Fig. 1). ANOVA tests revealed significantly different frequency patterns between fields, genders, and countries, but no significant differences between regions and positions (see Table S4). The Social Sciences demonstrated the highest familiarity with Gen AI tools, followed by Arts and Humanities, Engineering, and Natural Sciences, while Medical and Health Science had the least. Switzerland, The Netherlands, and India had the highest awareness of Gen AI tools, with Russia, Turkey, and Japan having the least (see Table S6).

Just over half (54.7 %) of the publishing academics reported using Gen AI tools at least monthly for academic purposes, while only 28.2 % never used them (Fig. 2). ANOVAs revealed significant differences in usage frequency patterns between fields, genders, countries, regions, and positions (Table S7). PhD students were the highest users of Gen AI tools, followed by Assistant Professors and Instructors. Social Sciences had the highest adoption rates, followed by Engineering. Internationally, Taiwan, South Korea, India and Iran had high levels of adoption of AI in their daily academic tasks. In contrast, the United States, the UK, China and Russia had the lowest adoption. A similar pattern was seen based on the regions with high frequency of usage in East Asia, South, and the Middle East (Table S8). High use might coincide with a need for translation services (academics in countries where English is neither spoken nor commonly taught but needing to publish in English) and easy access to relevant tools.

For the publishing researchers that formed our sample, Gen AI tools are used more frequently for research than for teaching or administration. For research, 62.5 % of respondents reported using AI tools at least monthly, while only 13.4 % never use them (Fig. 3). ANOVA tests for research activities showed significant differences between genders, regions, and positions. In contrast, no significant differences were found between fields and countries (Table S10, Part 1). The adoption of AI tools in research is widespread across academic positions, with the highest usage among PhD students and scientists/postdocs and moderate usage among full professors, associate professors, and assistant professors/lecturers/senior lecturers (Table S14).

For teaching, 41 % of respondents use AI tools at least monthly, and 32.7 % never use them (See Table S8 and Fig. 3). ANOVA tests identified significant differences based on country and position in teaching activities; however, no significant differences were found for fields, gender, or region (Table S10, Part 2). The highest use for teaching was reported by Assistant Professors/Lecturers and Associate Professors, whereas Scientists/Researchers have the lowest frequency. Taiwan and India had the highest frequency, and Australia, France, Canada, The Netherlands, and the United States had the lowest frequency (Table S14).

For our publishing researchers, 41.4 % use AI tools at least monthly for administrative tasks, while 39.5 % of respondents never use them for this purpose (see Table S9). A significant difference based on ANOVA tests was observed in administrative tasks based on position, but none for field, gender, country, or region (see Table S10, Part 3). PhD students and Assistant professors used AI tools the

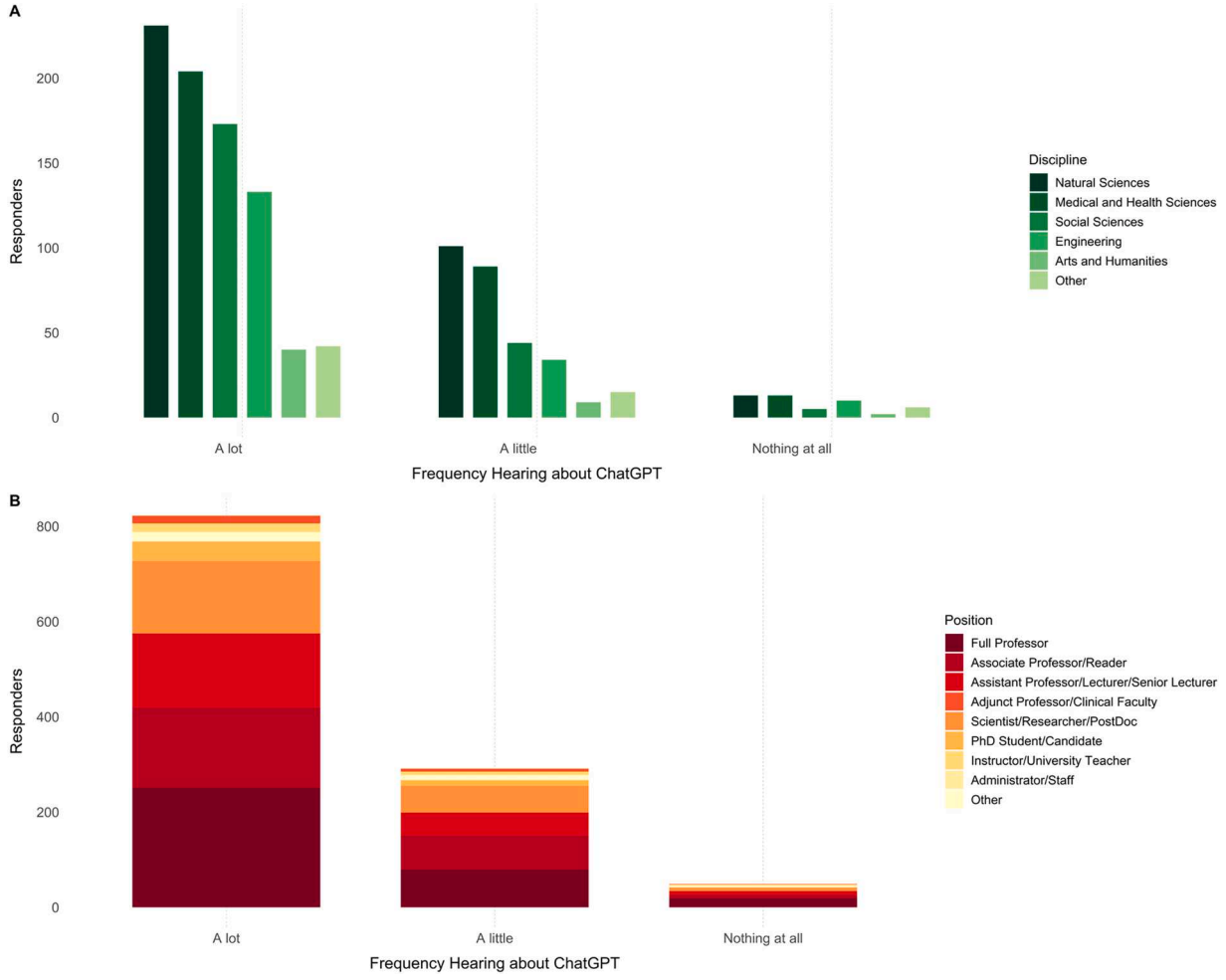

Fig. 1. A). Respondents' awareness of Gen AI tools by academic discipline (A) and Positions (B).

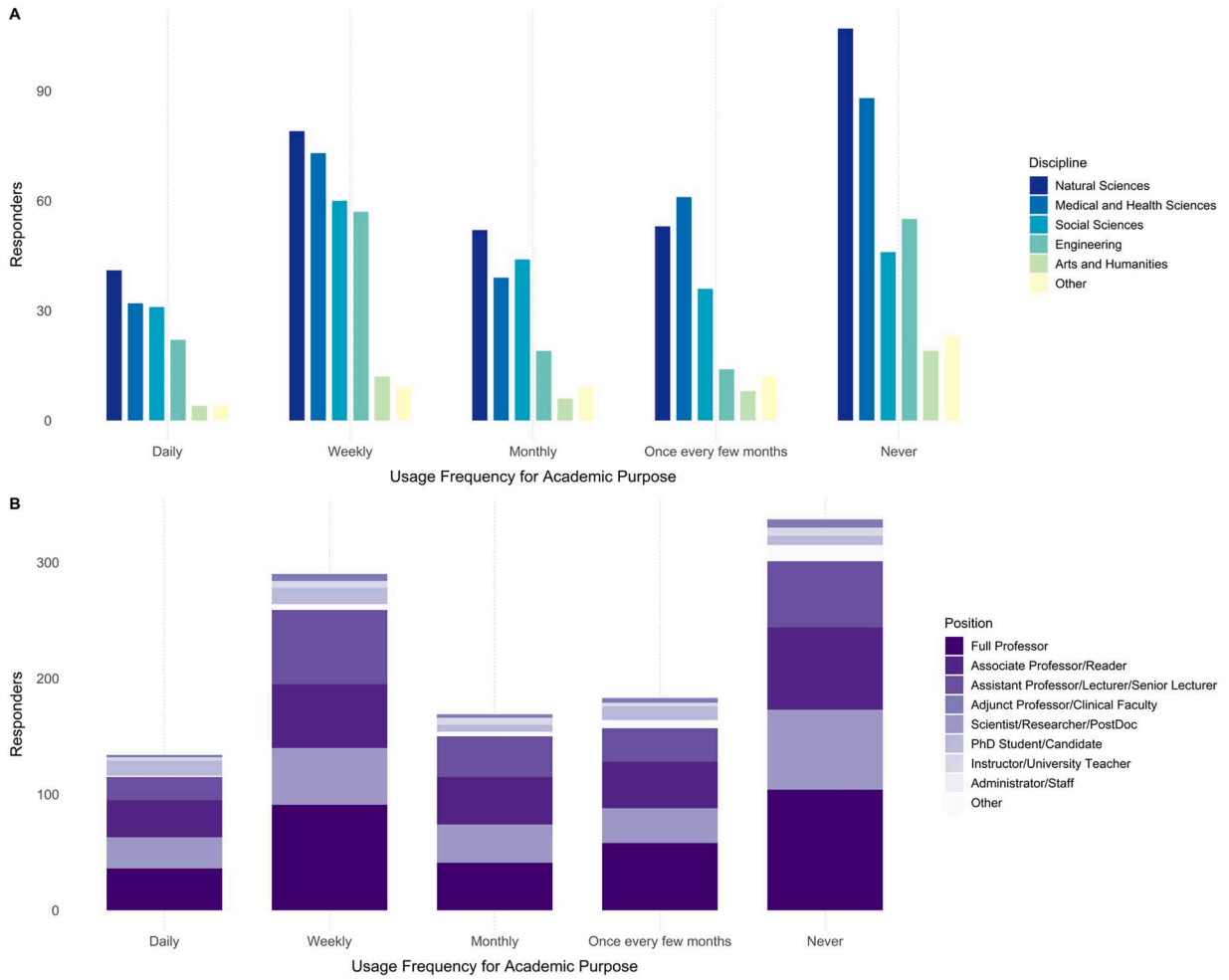

Fig. 2. Frequency of Gen AI Tool use for academic purposes among survey respondents based on academic disciplines (A) and positions (B).

most frequently, while others used them less frequently for administrative activities (Table S9).

4.2. Applications of Gen AI in research

The most popular use of AI tools for research is translating text from a foreign language (13.5 %), followed by proofreading drafts (13.0 %), synthesizing initial drafts into academic texts (12.5 %), and assisting with literature reviews (12.46 %) (see Fig. 4 and Table S12). Less common uses include supporting data analysis (6.4 %) and supporting or opposing viewpoints (4.9 %). Usage for translation was consistent across genders and fields but not under geographic conditions. Pearson's Chi-square test results show a significant difference in research usage only between genders, with non-significant differences between fields, countries, regions, and positions (Tables S12 and S13).

4.3. Application of gen AI in teaching

The most common use of AI tools in teaching is creating content and materials (30.3 %), followed by learning, and teaching new concepts (21.6 %). Additionally, 15.6 % of participants use AI to design assignments, and 12.6 % use it for drafting syllabi (see Fig. 5 and Table s16). Less frequent applications include providing feedback to students and grading assignments.

An importance analysis was conducted to investigate the source of the above differences. Significant differences in teaching usage were found only between fields but not for gender, country, region, and position. Medical and Health Science, Social Sciences, and Natural Sciences contribute more to the differences than other disciplines. Medical and Health Sciences use Gen AI more for providing feedback to students, while Natural Sciences use AI less for this.

To verify whether the frequency order of the reasons is statistically significant and whether any reasons are statistically significantly more frequent than the others, we chose the Stratified Bootstrap test. This test can tell whether groups of reasons are

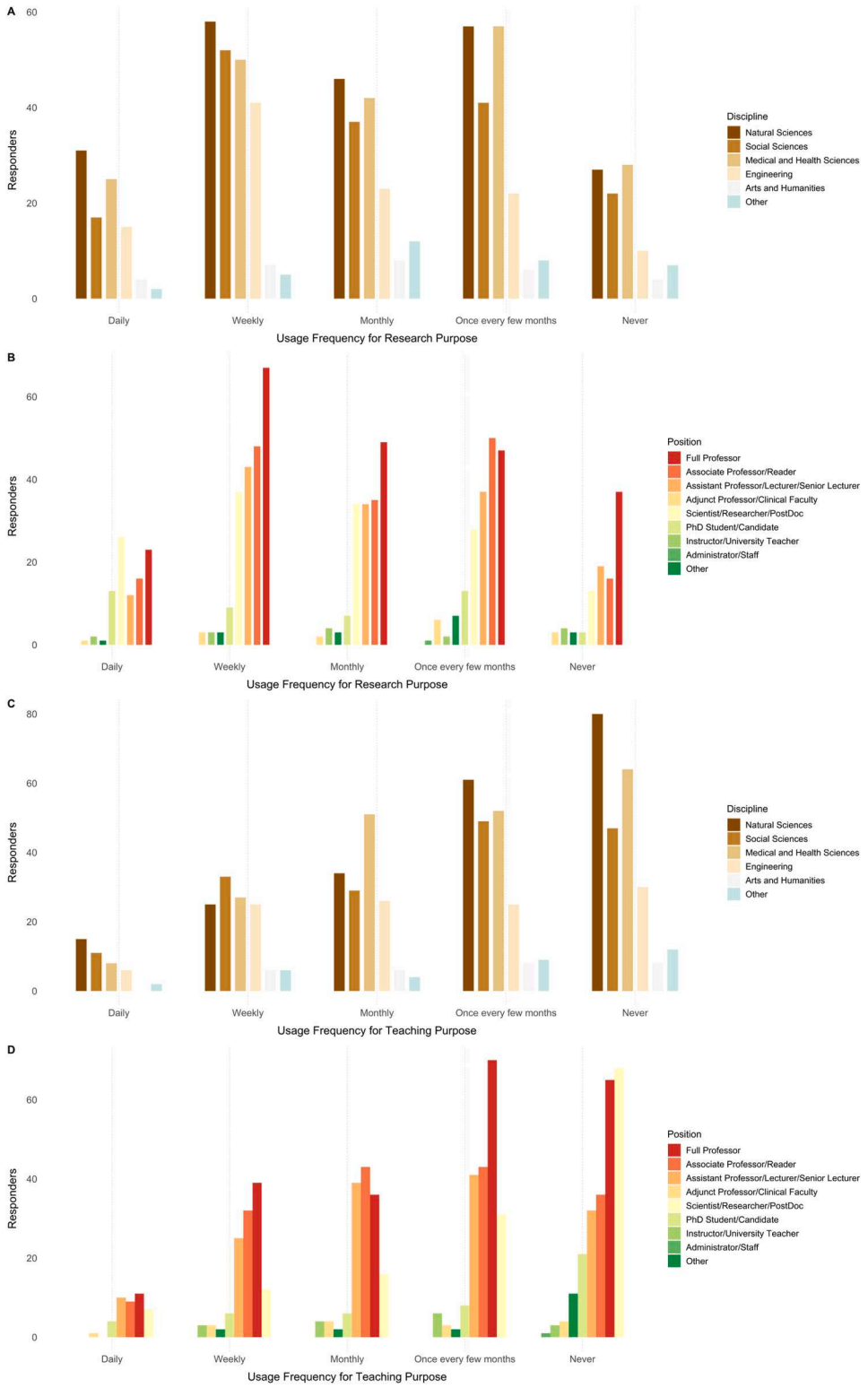

Fig. 3. Usage frequency for Gen AI tools in research activities among survey respondents by academic disciplines (A) and positions (B). Usage frequency of gen AI tools for teaching tasks among survey respondents by academic disciplines (C) and positions (D).

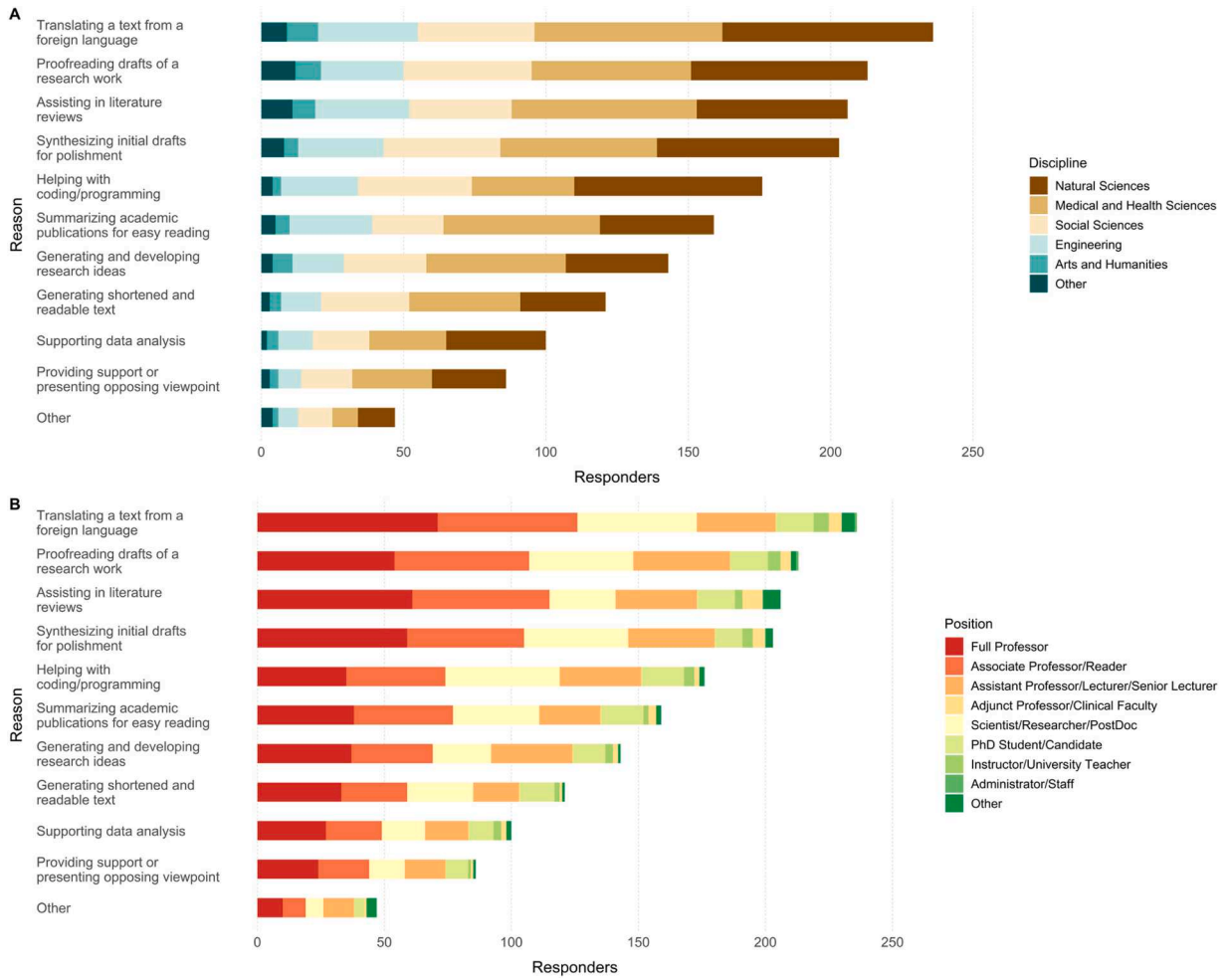

Fig. 4. Reasons for using gen AI tools in research activities among survey respondents based on academic disciplines (A) and positions (B).

significantly more used than the other reasons and how many groups there could be. In ideal cases, there will be only one reason in a group, i.e., there's a significant order of usage frequency.

Using the above test, full professors ($p = 0.03$) and adjunct professors ($p = 0.03$) are statistically significantly more likely to create teaching content/materials and learn and teach new concepts and theories. For countries, Spain ($p = 0.02$) and Italy ($p = 0.05$) are statistically significantly more likely to create teaching content/materials. Europe ($p = <0.001$) is also creating teaching content/materials more, while the top three usages in East Asia ($p = 0.05$) are creating teaching content/materials, learning and teaching new concepts and theories, and designing assignments. For academic fields, we found the significantly most likely usage in Medical and Health Sciences ($p < 0.001$) is creating teaching content/materials. The two most common uses in Engineering ($p = 0.02$) and Natural Science ($p = 0.01$) were creating teaching content/materials, and learning and teaching new concepts and theories. (See Table S17 for complete p tables).

4.4. Benefits of Gen AI in academia

The most significant perceived benefit of Gen AI tools in academia was personalized tutoring or instruction, with 37.4 % of respondents agreeing or strongly agreeing that it was a benefit. This was followed by improving problem-solving abilities (35.2 %) and enhancing students' learning in higher education (34.5 %). Perceptions were mixed about Gen AI's utility for fostering creativity and ideation in research projects, with 31.2 % of respondents agreeing or strongly agreeing, while 35.9 % expressed disagreement or strong disagreement. Disagreements were most marked regarding generating accurate and reliable content. Only 20.6 % of respondents expressed confidence in the accuracy and reliability of AI-generated content, while 30.7 % were neutral, and almost half (48.7 %) disagreed or strongly disagreed. The trend was similar for consistency and stability in generating content by AI, with only 20.0 % expressing agreement, while 50.1 % expressed varying degrees of disagreement. See Fig. 6 for detailed responders' distribution on the benefit agreement. The results show no significant difference based on disciplines, positions, genders, and countries regarding the

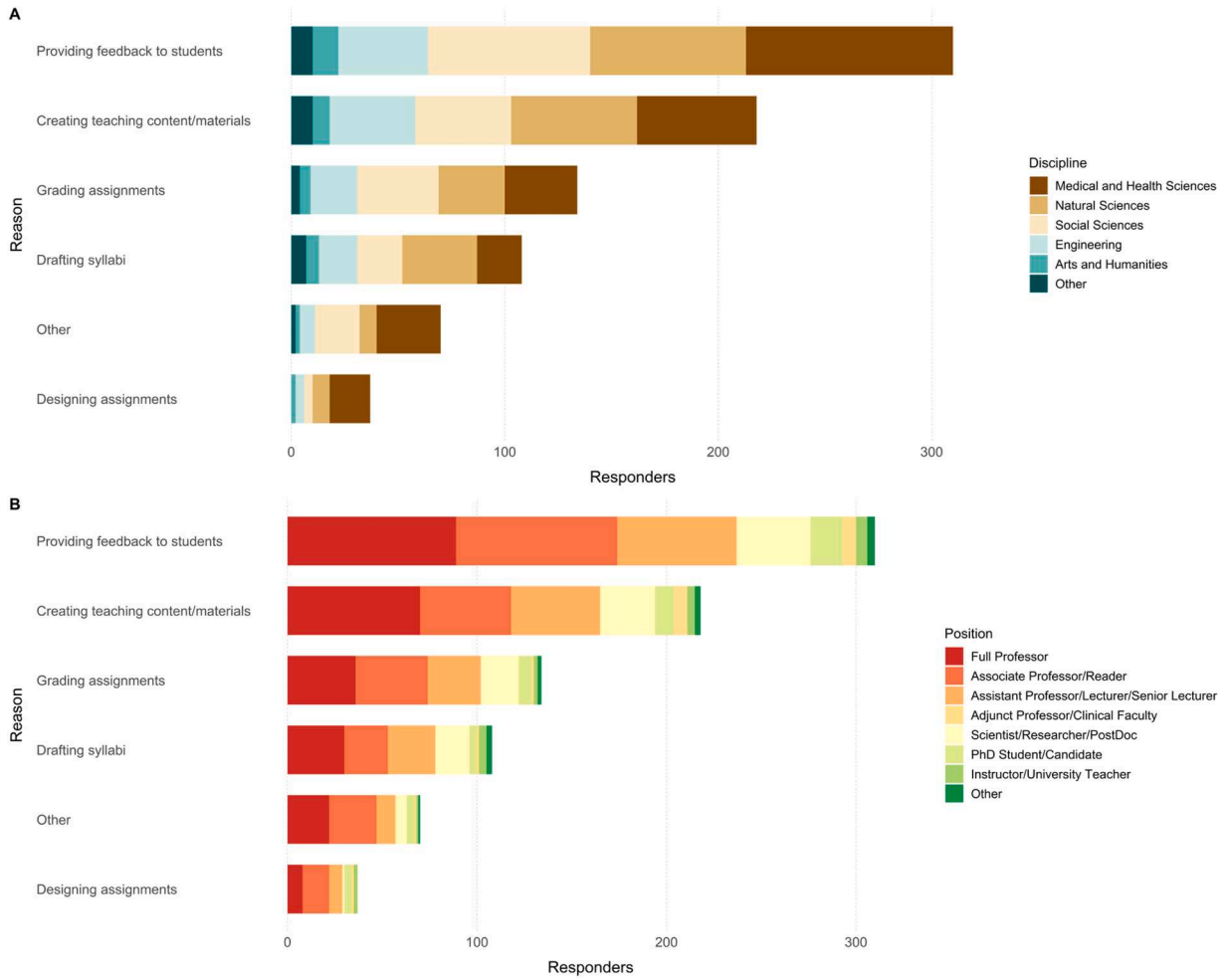

Fig. 5. Reasons for using gen AI tools in teaching activities by academic disciplines (A) and Roles (B).

perception of the benefit of Gen AI; see Table S20 for the complete p table.

4.5. Concerns about Gen AI in academia

Information accuracy was the most concerning issue reported (67.8 % of participants expressed moderate or extreme concern). Other substantial concerns include plagiarism (65.0 %), discouraging critical thinking (61.7 %), lack of transparency in AI-generated content (59.2 %), lack of explainability in AI decision-making (57.8 %), intellectual property rights violations (52.2 %), data privacy violations (49.0 %) and bias and unfairness in the generated content (41.3 %) (see Table S21). According to the Stratified Bootstrap test results (see Table S22), the top concern is inaccurate information. Overall, inaccurate information, increased plagiarism, and discouraging critical thinking skills are the top three concerns among all participants, and as a group, they are significantly more common (Fig. 7).

For males, "Inaccurate information," "Increased plagiarism," and "Discourage critical thinking skills" are the most common concerns ($p = 0.048$, CI [0.001, 0.248]. Based on geography, in Japan ($p = 0.047$, CI [0.016, 0.814]), Taiwan ($p = 0.026$, CI [0.061, 0.902]), and East Asia & Pacific ($p = 0.037$, CI [0.017, 0.466]), "Inaccurate Information" is the biggest concern. For academic positions, Scientist/Researcher/PostDocs' ($p = 0.022$, CI [0.031, 0.462]) top concern is "Inaccurate Information", see Table S22 for a complete p table.

5. Discussion

This study demonstrates a high international level of awareness of Gen AI tools in academia, as of January-March 2024, with some significant differences between roles, fields, genders, and countries. Field norms and priorities may influence exposure to these technologies with more familiarity in the humanities, social sciences, and engineering than pure science, which aligns with former

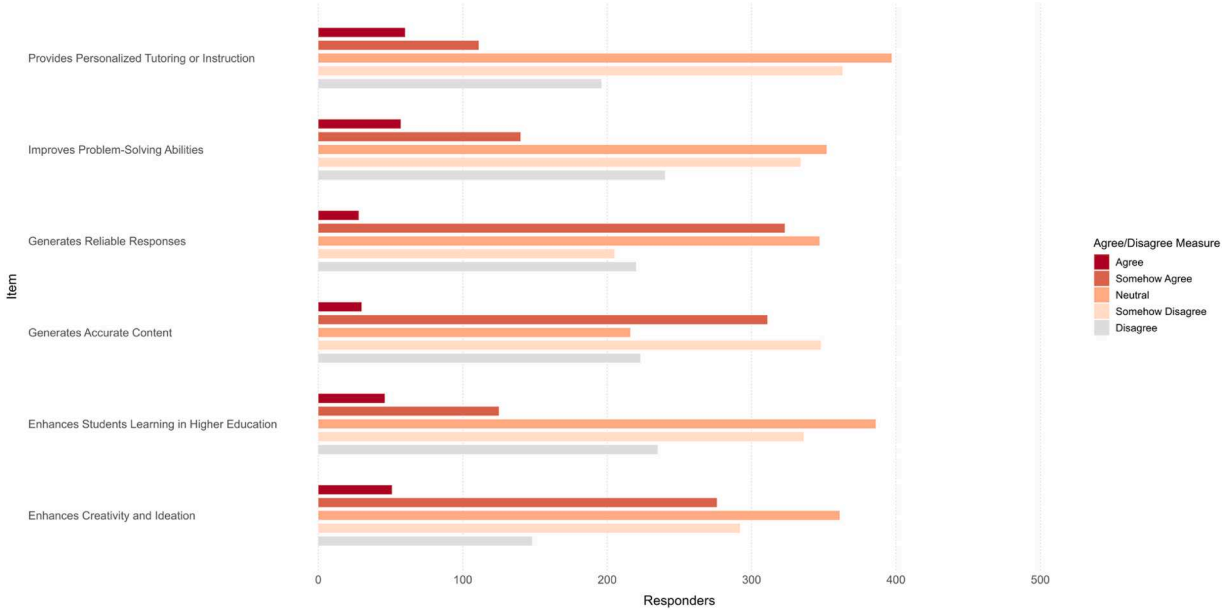

Fig. 6. Perceived benefits of Gen AI tools in academia.

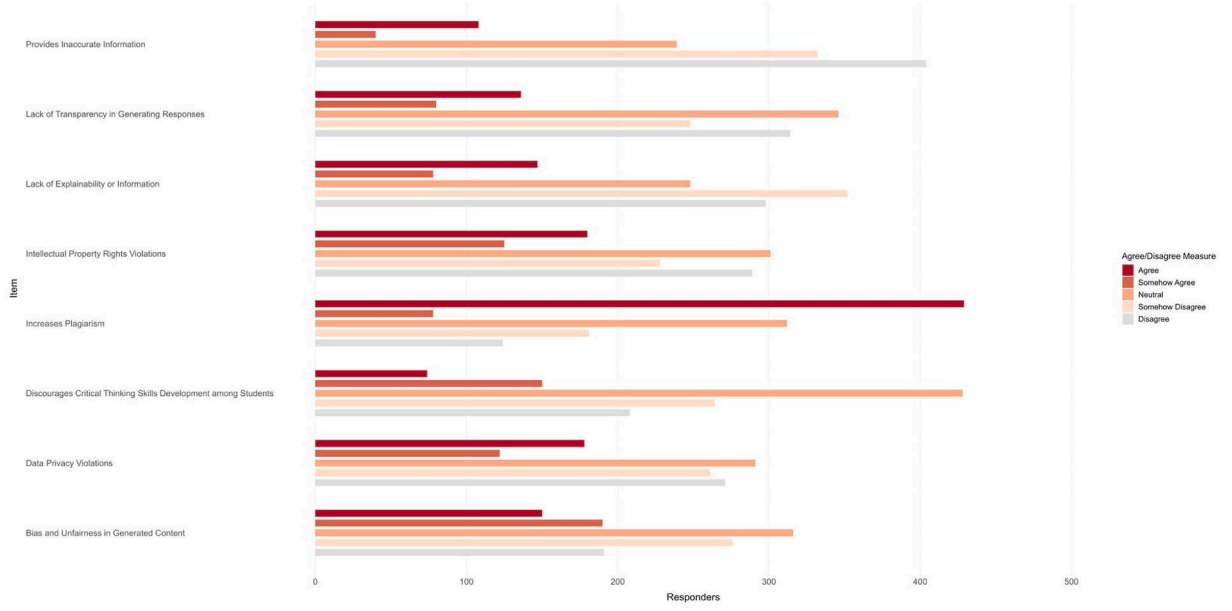

Fig. 7. Levels of concern about the use of gen AI tools in academic and educational contexts.

studies with smaller samples (Qu et al., 2024; Stöhr et al., 2024). The high awareness in Switzerland, The Netherlands, and India, and lower familiarity in Russia, Turkey, and Japan may be due to the need for academic text writing in English and translation.

The use of Gen AI at least monthly by most participants reflects substantial integration of Gen AI into academic work; nevertheless, barriers persist for the substantial minority of non-users, including a lack of awareness and skepticism. The variation in usage across academic roles suggests that early career academics, such as PhD students and Assistant Professors, were the most willing to experiment with these new technologies. The higher adoption rate of Gen AI by social science and engineering scholars than those in pure or basic science fields may have two different spectrums of use, from non-technical tasks in social science to innovative technical solution activities in engineering fields. Language may also be more important and less technical in the social sciences, creating more need for Gen AI tools. Senior academics should be aware of the higher Gen AI use by junior colleagues and consider whether they need to make additional efforts to learn the technologies.

Many participants use Gen AI applications for teaching frequently, although some researchers may not teach at all. The highest adoption of AI for teaching was among Assistant Professors and Lecturers, which may reflect heavy teaching responsibilities, while Scientists prioritize research over teaching (if they do any), reflecting role-specific differences in AI adoption. The higher adoption of Gen AI for teaching in Taiwan and India compared to Western nations may be related to translation needs or to different approaches; the former may focus on innovation and currency in teaching, whereas the latter may be more concerned about copyright and plagiarism.

In terms of gender, there was generally higher awareness of and use of Gen AI from males compared to females. Females were 10 % less likely to use Gen AI weekly or daily for research, 4 % less likely for teaching and 3 % less likely for administrative tasks, Thus, there seems to be a need to ensure that female researchers are not falling behind in making use of Gen AI tools.

6. Limitations

The use of Scopus as the survey source is a limitation since not all active researchers publish articles in Scopus. Nevertheless, in the absence of an alternative large-scale interdisciplinary source of academic email addresses, it is a pragmatic choice. Another limitation of this study is the selection of countries with large numbers of authors. Consequently, the findings may not be representative of academic research in nations with smaller research communities.

7. Theoretical contribution

Although this research did not begin with a predetermined theoretical lens, the findings offer empirical alignment with *socio-technical* theoretical frameworks, which indicate technology shaped by social and institutional contexts, particularly in education and research (Meyer & Schroeder, 2009; Orlikowski, 1992; Selwyn, 2011). Our findings provide evidence that the perceived benefits and concerns of Gen AI are not independent but relate to social values, as suggested by the sharp disciplinary and country differences found. For instance, the differential use of Gen AI across disciplines reflects varying epistemic cultures and norms of evidence. Furthermore, this study suggests that local academic cultures, norms, and policy environments mediate Gen AI use.

8. Practical implications

The international differences found suggest that Gen AI has more uses and greater benefits for researchers in many, but not all, non-Western countries. In the future, the greater familiarity that they have developed may give them a competitive advantage in both teaching and research. Policymakers in low-adoption countries may consider whether their relatively weak position in this apparently critical technology poses a longer-term threat to the effectiveness of their researchers. Thus, it may be important to proactively promote Gen AI in low-use areas. Surprisingly, the social sciences and humanities do not seem to be behind in this emerging technology, however, so no action is needed in this regard. Finally, there were also some gender differences in the results, and action may be needed to support more female researchers to use Gen AI tools.

9. Future research direction

Further studies are needed to address the identified gaps and challenges, ultimately enhancing the integration and effectiveness of these tools in academic settings. Future research can investigate the factors driving adoption rates across academic disciplines. Academic writing for non-native English-speaking researchers has been a barrier as a result the effectiveness of Gen AI tools in non-Western countries can also be explored. Studies should also investigate the effectiveness of Gen AI in problem-solving scenarios, particularly in complex academic tasks, to determine its potential for fostering deeper understanding and innovative thinking. It is also worth investigating how key concerns such as plagiarism can be mitigated through improved AI algorithms and stricter academic policies. Future research should also explore the influence of Gen AI on critical thinking skills among students, including how these tools can support rather than hinder the development of independent analytical abilities.

CRediT authorship contribution statement

Ehsan Mohammadi: Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Mike Thelwall:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Yizhou Cai:** Writing – original draft, Software, Methodology, Formal analysis, Data curation. **Taylor Collier:** Writing – review & editing, Writing – original draft, Conceptualization. **Iman Tahamtan:** Writing – review & editing, Methodology, Conceptualization. **Azar Eftekhar:** Writing – review & editing, Methodology, Conceptualization.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ipm.2025.104350.

Data availability

The data that has been used is confidential.

References

Abdaljaleel, M., Barakat, M., Alsanafi, M., Salim, N. A., Abazid, H., Malaeb, D., Mohammed, A. H., Hassan, B. A. R., Wayyes, A. M., Farhan, S. S., El Khatib, S., Rahal, M., Sahban, A., Abdelaziz, D. H., Mansour, N. O., AlZayer, R., Khalil, R., Fekih-Romdhane, F., Hallit, R., Hallit, S., & Sallam, M. (2024). A multinational study on the factors influencing university students' attitudes and usage of ChatGPT. *Scientific Reports, 14*(1983). https://doi.org/10.1038/s41598-024-52549-8

Aldasoro, I., Armantier, O., Doerr, S., Gambacorta, L., & Oliviero, T. (2024). Survey evidence on gen AI and households: Job prospects amid trust concerns. *Bank for International Settlements Bulletin, 86*.

Alser, M., & Waisberg, E. (2023). Concerns with the usage of ChatGPT in academia and medicine: A viewpoint. *American Journal of Medicine Open, 9*. https://doi.org/10.1016/j.ajmo.2023.100036

Barisano, M., Awad, N., Dahik, A. Bedard, J., Monu, U., Mundhra, U., & Lou, K. (2024). Women leaders in tech are paving the way in GenAI. https://www.bcg.com/publications/2024/women-leaders-in-tech-are-paving-the-way-in-genai.

Bikanga Ada, M. (2024). It helps with crap lecturers and their low effort: Investigating computer science students' Perceptions of using ChatGPT for learning. *Education Sciences, 14*(10), 1106. https://doi.org/10.3390/educsci14101106

Bornmann, L., Wu, L., & Ettl, C. (2024). The use of ChatGPT for identifying disruptive papers in science: A first exploration. *Scientometrics, 129*(11), 7161–7165.

Clark, E., August, T., Serrano, S., Haduong, N., Gururangan, S., & Smith, N.A. (2021). All that's `human' is not gold: Evaluating human evaluation of generated text. *Proceedings of the 59th Annual Meeting of the Association for Computational Linguistics and the 11th International Joint Conference on Natural Language Processing (Volume 1: Long Papers)*, 7282–7296. https://doi.org/10.18653/v1/2021.acl-long.565.

Chan, C. K. Y., & Hu, W. (2023). Students' voices on generative AI: Perceptions, benefits, and challenges in higher education. *Int J Educ Technol High Educ, 20*(43). https://doi.org/10.1186/s41239-023-00411-8

Dergaa, I., Chamari, K., Zmijewski, P., & Saad, H. B. (2023). From human writing to artificial intelligence generated text: Examining the prospects and potential threats of ChatGPT in academic writing. *Biology of Sport, 40*(2). https://doi.org/10.5114/biolsport.2023.125623

Erduran, S. (2023). AI is transforming how science is done. Science education must reflect this change. *Science (New York, N.Y.), 382*(6677). https://doi.org/10.1126/science.adm9788

Fauzi, F., Tuhuteru, L., Sampe, F., Ausat, A. M. A., & Hatta, H. R. (2023). Analysing the role of ChatGPT in improving student productivity in higher education. *Journal on Education, 5*(4), 14886–14891. https://doi.org/10.31004/joe.v5i4.2563

Firaina, R., & Sulisworo, D. (2023). Exploring the usage of ChatGPT in higher education: Frequency and impact on productivity. *Buletin Edukasi Indonesia, 2*(1), 39–46. https://doi.org/10.56741/bei.v2i01.310

Freeman, J. (2025). *Student generative AI survey 2025*. Higher Education Policy Institute. https://www.hepi.ac.uk/2025/02/26/student-generative-ai-survey-2025/.

Gayed, J. M., Carlon, M. K. J., Oriola, A. M., & Cross, J. S. (2022). Exploring an AI-based writing assistant's impact on English language learners. *Computers and Education: Artificial Intelligence, 3*. https://doi.org/10.1016/j.caeai.2022.100055

Glassdoor Economic Research. (2024). Conversation starter: ChatGPT usage in the workplace more than doubles year over year. https://www.glassdoor.com/blog/conversation-starter-chatgpt-usage-in-the-workplace-more-than-doubles-year-over-year/.

Gruenhagen, J. H., Sinclair, P. M., Carroll, J. A., Baker, P. R. A., Wilson, A., & Demant, D. (2024). The rapid rise of generative AI and its implications for academic integrity: Students' perceptions and use of chatbots for assistance with assessments. *Computers and Education: Artificial Intelligence, 7*(100273).

Humlum, A., & Vestergaard, E. (2024). *The adoption of ChatGPT*. Becker Friedman Institute. https://bfi.uchicago.edu/insights/the-adoption-of-chatgpt/.

Imran, M., & Almusharraf, N. (2024). Google Gemini as a next generation AI educational tool: A review of emerging educational technology. *Smart Learning Environments, 11*(1), 22.

Islam, I., & Islam, M. N. (2023). Opportunities and challenges of ChatGPT in academia: A conceptual analysis. *Authorea.*. https://doi.org/10.22541/au.167712329.97543109/v1

Kalla, D., Smith, N., Samaah, F., & Kuraku, S. (2023). Study and analysis of ChatGPT and its impact on different fields of study. *International Journal of Innovative Science and Research Technology, 8*(3). https://ssrn.com/abstract=4402499.

Kousha, K. (2024). How is ChatGPT acknowledged in academic publications? *Scientometrics, 129*(12), 7959–7969. https://doi.org/10.1007/s11192-024-05193-y

Kumar, A. H. S. (2023). Analysis of ChatGPT tool to assess the potential of its utility for academic writing in biomedical domain. *Biology, Engineering, Medicine and Science Reports, 9*(1). https://doi.org/10.5530/bems.9.1.5

Liebrenz, M., Schleifer, R., Buadze, A., Bhugra, D., & Smith, A. (2023). Generating scholarly content with ChatGPT: Ethical challenges for medical publishing. *The Lancet, 5*(3). https://doi.org/10.1016/S2589-7500(23)00019-5

Lordling, N. (2023). How ChatGPT is transforming the postdoc experience. *Nature, 622*, 655–657. https://doi.org/10.1038/d41586-023-03235-8

Lund, B. D., Wang, T., Mannuru, N. R., Nie, B., Shimray, S., & Wang, Z. (2023). ChatGPT and a new academic reality: Artificial Intelligence-written research papers and the ethics of the large language models in scholarly publishing. *Journal of the Association for Information and Technology, 74*(5). https://doi.org/10.1002/asi.24750

Meyer, E. T., & Schroeder, R. (2009). Untangling the web of e-research: Towards a sociology of online knowledge. *Journal of Informetrics, 3*(3). https://doi.org/10.1016/j.joi.2009.03.006

Mohammadi, E., Cai, Y., Novin, A., Vera, V., & Soltanmohammadi, E. (2025). Who is a scientist? Gender and racial biases in Google vision AI. *AI and Ethics*. https://doi.org/10.1007/s43681-025-00742-4

Mohammadi, E., Thelwall, M., & Kousha, K. (2015). Can Mendeley bookmarks reflect readership? A survey of user motivations. *Journal of the Association for Information Science and Technology, 67*(5), 1198–1209.

Mohammadi, E., Thelwall, M., Kwasny, M., & Holmes, K. L. (2018). Academic information on Twitter: A user survey. *PloS one, 13*(5), Article e0197265. https://doi.org/10.1371/journal.pone.0197265

Naddaf, M. (2025). How are researchers using AI? Survey reveals pros and cons for science. *Nature*. https://doi.org/10.1038/d41586-025-00343-5

Nam, J. (2023). 56% of college students have used AI on assignments or exams. https://www.bestcolleges.com/research/most-college-students-have-used-ai-survey/.

OpenAI. (2023a). GPT-4 technical report. https://arxiv.org/pdf/2303.08774.pdf.

OpenAI. (2023b). Introducing GPTs. https://openai.com/blog/introducing-gpts.

Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. *Organization Science, 3*(3), 398–427. http://www.jstor.org/stable/2635280.

Otis, N., Clarke, R., Delecourt, S., Holtz, D., & Koning, R. (2024). The uneven impact of generative AI on entrepreneurial performance. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4671369

Park, E., & Gelles-Watnick, R. (2023). Most Americans haven't used ChatGPT; Few think it will have a major impact on their job. https://www.pewresearch.org/short-reads/2023/08/28/most-americans-havent-used-chatgpt-few-think-it-will-have-a-major-impact-on-their-job/.

Oxford University Press. (2024). *Researchers and AI: Survey findings*. https://academic.oup.com/pages/ai-survey-findings.

Perkins, M. (2023). Academic integrity considerations of AI large language models in the post-pandemic era: ChatGPT and beyond. *Journal of University Teaching & Learning Practice, 20*(2). https://doi.org/10.53761/1.20.02.07

Qu, M. X. Y. Tan, & Wang, J. (2024). Disciplinary differences in undergraduate students' engagement with generative artificial intelligence. *Smart Learning Environments, 11*(51). https://doi.org/10.1186/s40561-024-00341-6

Rahman, M., Terano, H. J. R., Rahman, N., Salamzadeh, A., & Rahaman, S. (2023). ChatGPT and academic research: A review and recommendations based on practical examples. *Journal of Education, Management and Development Studies, 3*(1). https://ssrn.com/abstract=4407462.

Rahman, M. M., & Watanobe, Y. (2023). ChatGPT for education and research: Opportunities, threats, and strategies. *Applied Sciences, 13*(9). https://doi.org/10.3390/app13095783

Rahimi, F., & Abadi, A. T. B. (2023). ChatGPT and publication ethics. *Archives of Medical Research, 54*(3). https://doi.org/10.1016/j.arcmed.2023.03.004

Rasul, T., Nair, S., Kalendra, D., Robin, M., Santini, F. O., Ladeira, A. J., Sun, M., Day, I., Rather, R. A., & Heathcote, L. (2023). The role of ChatGPT in higher education: Benefits, challenges, and future research directions. *Journal of Applied Learning & Teaching, 6*(1). https://doi.org/10.37074/jalt.2023.6.1.29

Ray, P. P. (2023). ChatGPT: A comprehensive review on background, applications, key challenges, bias, ethics, limitations and future scope. *Internet of things and cyber-physical systems 3*. https://doi.org/10.1016/j.iotcps.2023.04.003

Sallam, M. (2023). ChatGPT utility in healthcare education, research, and practice: Systematic review on the promising perspectives and valid concerns. *Healthcare, 11*(6). https://doi.org/10.3390/healthcare11060887

Selwyn, N. (2011). Education and digital technology: The need for social realism? *Educational Technology, 51*(5). https://www.jstor.org/stable/44429955.

Sok, S., & Heng, K. (2023). ChatGPT for education and research: A review of benefits and risks. *SSRN*. https://doi.org/10.2139/ssrn.4378735

Stöhr, C., Ou, A. W., & Malmström, H. (2024). Perceptions and usage of AI chatbots among students in higher education across genders, academic levels and fields of study. *Computers and Education: Artificial Intelligence, 7*(100259). https://doi.org/10.1016/j.caeai.2024.100259

Sullivan, M., Kelley, A., & McLaughlan, P. (2023). ChatGPT in higher education: Considerations for academic integrity and student learning. *Journal of Applied Learning & Teaching, 6*(1). https://doi.org/10.37074/jalt.2023.6.1.17

Surameery, N. M. S., & Shakor, M. Y. (2023). Use ChatGPT to solve programming bugs. *International Journal of Information Technology and Computer Engineering, 3*(1). https://doi.org/10.55529/ijitc.31.17.22

Thelwall, M. (2024). ChatGPT for complex text evaluation tasks. *Journal of the Association for Information Science and Technology*, 1–4. https://doi.org/10.1002/asi.24966

Thorp, H. H. (2023). ChatGPT is fun, but not an author. *Science (New York, N.Y.), 379*(6630), 313. https://doi.org/10.1126/science.adg7879. –313.

van Dis, E. A. M., Bollen, J., Zuidema, W., van Rooij, R., & Bockting, C. L. (2023). ChatGPT: Five priorities for research. *Nature, 614*. https://doi.org/10.1038/d41586-023-00288-7

Ventayen, R. J. M. (2023). OpenAI ChatGPT generated results: Similarity index of Artificial intelligence-based contents. *Advances in Intelligent Systems and Computing*. https://doi.org/10.2139/ssrn.4332664. Available at *SSRN*.

Wen, J., & Wang, W. (2023). The future of ChatGPT in academic research and publishing: A commentary. *Clinical and Translational Medicine, 13*(3). https://doi.org/10.1002/2Fctm2.1207

Wang, L., & Ren, B. (2024). Enhancing academic writing in a linguistics course with generative AI: An empirical study in a higher education institution in Hong Kong. *Education in Science : The bulletin of the Association for Science Education, 14*(12). https://doi.org/10.3390/educsci14121329

Yan, W., Hu, B., Liu, Y., Li, C., & Song, C. (2024). Does usage scenario matter? Investigating user perceptions, attitude and support for policies towards ChatGPT. *Information Processing & Management, 61*(6), Article 103867. https://doi.org/10.1016/j.ipm.2024.103867

Yang, H. (2023). How I use ChatGPT responsibly in my teaching. *Nature*. https://doi.org/10.1038/d41586-023-01026-9

Zhao, X. (2023). Leveraging artificial intelligence (AI) technology for English writing: Introducing Wordtune as a digital writing assistant for EFL writers. *RELC Journal, 54*(3). https://doi.org/10.1177/00336882221094089

Zhu, Z., Yang, Y., & Sun, Z. (2024). HaluEval-wild: Evaluating hallucinations of language models in the wild. *arXiv preprint arXiv:2403.04307*.