The Impact of Generative Artificial Intelligence Technologies on Chinese Librarians' information Behavior and Ethical Discussion: An Empirical Study Based on a Small Sample

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ABSTRACT

This study used a combination of questionnaires and interviews to survey 68 librarians in mainland China. The questionnaire was divided into three parts: (1) providing descriptive statistics of the interviewed librarians; (2) exploring the impact of generative technologies on librarians' information behaviour from work scenarios; (3) investigating librarians' concerns about ethics and strategies for coping with ethical challenges. The results show that generative AI technologies had a greater impact on information seeking, information encountering, and information using behaviours, and an insignificant impact on information sharing behaviours. In addition, the results of the study reflect that 67.65% of librarians showed a very high level of concern about privacy and security; 66.18% of them believed that the content generated by the tools needed further validation. The study also provided six recommendations from the perspective of libraries and librarians to address ethical challenges such as the spread of disinformation and bias.

ALISE RESEARCH TAXONOMY TOPICS

Data management ; Human-computer interaction & design; Information practices; Education of information professionals; Information services.

AUTHOR KEYWORDS

Generative Artificial Intelligence Technology; Information Behavior; Information Ethics

DOI: https://doi.org/10.21900/j.alise.2024.1648

INTRODUCTION

On November 30, 2022, OpenAI released the generative AI tool ChatGPT, which caused a global buzz at its launch, and both academia and industry are exploring the application of the tool. Libraries are rich in knowledge and culture. Librarians are the main providers of knowledge services, so the combination of AI technology and knowledge management will undoubtedly lead to dramatic changes in library services (Al-Aamri & Osman, 2022). What are the typical scenarios in which librarians use this technology? Did the implementation of technology improve the service quality and efficiency of the librarians? These questions concern the direction of libraries in the information age.

Meanwhile, the topic of "Artificial Intelligence and Information Ethics" has always been widely discussed in academic circles. The ethical challenges arising from the use of tools such as bias, disinformation dissemination, and academic integrity have been thoroughly examined, particularly after the emergence of generative AI technologies (Guleria et al., 2023a, 2023b). Mason (1986) conducted a study on ethical issues related to information systems and proposed the PAPA theory, which includes privacy, accuracy, property, and accessibility. While intelligent chatbots are capable of fulfilling almost any text-based request (Liu et al., 2021), their use must be evaluated for ethical and moral risks. ChatGPT generates content based on probabilistic distribution relationships, which cannot guarantee the authenticity and accuracy of the content. If used without scrutiny in academic research, it risks spreading false information (Wang et al., 2023) or triggering bias in terms of gender and race (Hutchinson et al., 2020). Therefore, it is important for librarians to use these tools scientifically and raise awareness of information ethics. How can libraries and librarians respond to the challenges posed by ethical issues in information and technology? This study explores these questions.

Current research on librarians' information behavior is limited. McDonald et al. (2015) used face-to-face interviews to collect the personal information behavior of eight librarians in the Greater New York City Area to explore the factors that influence librarians' information behavior in terms of institutional type, career length, and the need to use digital devices. No studies have been conducted on librarians' information behavior since the advent of generative technologies.

To better understand librarians' attitudes towards new technologies and help them adapt to the information age, an exploratory study was conducted. The study aimed to establish a correlation between information behaviors and librarians' functions, design a questionnaire based on work scenarios, and investigate the frequency of their use of generative AI tools, scenarios, and usage feelings. The ultimate goal was to improve the quality of library services and promote scientific tool usage. Three senior librarians were selected to conduct remote interviews. We expected that the study will provide data from the Chinese region for the LIS study.

METHOD

The study mainly used survey and interview methods to collect data from 68 librarians in mainland China by distributing online questionnaires. Due to the limitations of the questionnaire framework, the scalability and freedom of the collected responses were limited. In order to deepen the librarians' views on the use of generative AI products and their reflections on the ethical issues, the study used the interview method to supplement the questionnaire content.

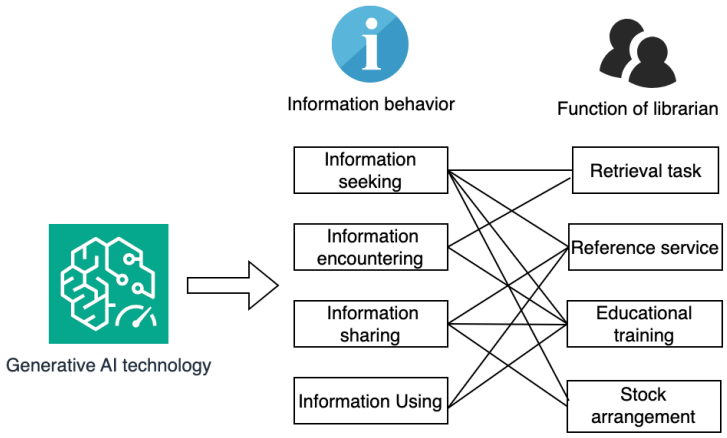
The process of selecting interviewees is as follows: first, search for articles related to "Generative AI, Librarians, Information Behavior and Ethics" in the Chinese database CNKI; second, read the articles and select those that have in-depth thoughts and insights on "Information

Behavior and Ethics"; finally, read the articles that have unique insights. Finally, the first and corresponding authors of the articles were selected to be interviewed. Three senior librarians were identified as willing to be interviewed, two from university libraries and one from a medical library.

Based on Donald's classification (Donald, 2006), this study classifies librarians' information behaviors into four main categories: information seeking, information encountering, information sharing, and information using. In order to make the questionnaire questions scientific and effective, and to maximize the closeness to the respondents' daily lives, this study corresponds librarians' information behaviors to their specific functions based on the classification (Fig. 1), and designs the questionnaire questions in terms of work functions and usage scenarios.

Figure 1

The Corresponding Relationship between Information Behavior and Librarian Function



The study consisted of 18 questions divided into three main parts: 1) items 1-5 gathered participants' basic information, such as gender and title; 2) items 6-14 surveyed librarians' information behaviors in actual work scenarios; and 3) items 15-18 assessed librarians' ethical awareness and ability to cope with ethical challenges when using generative AI tools. Table 1 displays the questionnaire content, with the purpose of the questioning in the first column and the corresponding topic in the third column.

Table 1

Questionnaire Content and Segmentation

Purpose	No	Topic
Part 1 Basic information of respondents	1	Gender
	2	Age
	3	Degree
	4	Academic title
	5	Type of institution

	6	Frequency of use of generative AI tools
	7	Information seeking：The choice of retrieval route before the advant of AI tools.
	8	Information seeking：The choice of retrieval route after the advant of AI tools.
	9	Information seeking: help with search strategy development
Part 2 Information behavior	10	Information seeking and encountering: help with enlightened search
	11	Information sharing: Changes in willingness to share information
	12	Information use: help to improve the accuracy of user personalized recommendations
	13	Informaiton use: help with teaching practice
	14	Information use ： help to organize information and reduce users' inquiry response time
	15	Concerns about user privacy leakage
Part 3 Information ethics	16	Evaluation of the credibility of tools
	17	Verification of the accuracy of information
	18	Information Ethics Worries

DATA ANALYSIS and RESULTS

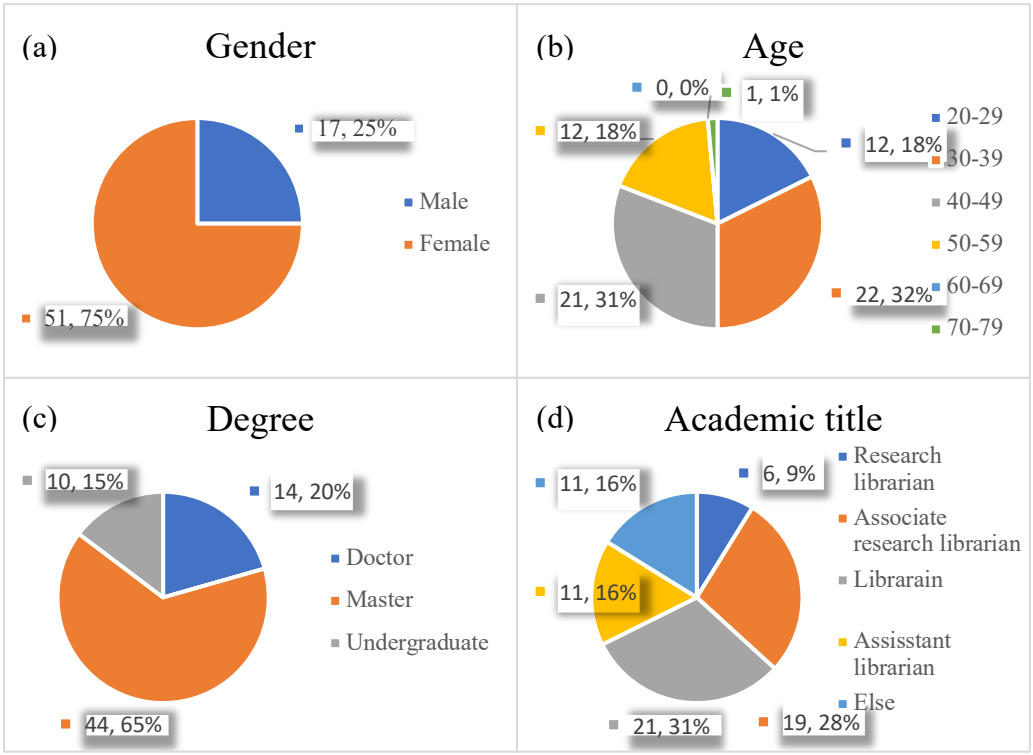
Given that the online questionnaire comprises single-choice, multiple-choice, ranking, Likert scale, and open-ended questions, all items, with the exception of the open-ended queries, are mandatory. This ensures that there are no missing or incorrect responses, nor are there instances of duplicate submissions. Consequently, the total count of valid questionnaires stands at 68.

In Part 2 and 3 of the questionnaire, No. 7-8 aim to explore changes in librarians' retrieval methods before and after the emergence of generative AI products. Questions 6 and 9-17 of the questionnaire use a five-point Likert scale method (Likert, 1932). The question statement is "How much/likely you are___"with answer options ranging from 'very little' to 'very much' and assigned values of 1-5. No. 18 is an open-ended question aimed at understanding librarians' concerns regarding information ethics.

Results of Part 1

The survey had 68 librarian volunteers, with 36 from university libraries and 32 from specialized libraries. Descriptive statistics were provided for their gender (Fig. 2a), age (Fig. 2b), education (Fig. 2c), and job title (Fig. 2d).

Figure 2
Characteristics of the Participants



Observation of Figures 2(a) and (b) reveals that 75% of the surveyed librarians were female, and the majority of librarians were aged between 30-49. Figure 2(c) indicates that 85% of the participants held a master's degree or higher, with 65% holding a master's degree and 20% holding a doctoral degree, indicating a high overall literacy level. Figure (d) shows the titles of the participants, with librarians (21, 31%) and associate research librarians (19, 28%) being the most common. The majority of respondents hold intermediate or senior titles, indicating extensive work experience and advanced professional skills. The survey sample is highly representative of the overall population.

Results of Part 2

Part 2 explores the impact of generative AI technologies on librarians' information-seeking, information-encountering, information-sharing, and information-utilization behaviors. The questions raised are whether the tool affects the traditional functions of librarians. This study conducted descriptive statistics of No.6 and No.9-14 using a Likert scale, as shown in Table 2. The assigned values range from 1 to 5, with I representing a very little extent and V representing a very much extent. The last column of the table displays the mean score of the item.

In sections 7-8, we analyzed the priority of librarians' information retrieval paths before and after the emergence of generative tools. We asked librarians to rank the following in order of preference for retrieval assistance: 1) intelligent chatbots, 2) web search engines, 3) specialized thesis databases, and 4) scholarly communication communities. We then observed changes in the

ranking of chatbots to determine if librarians preferred AI tools for retrieval. The results are presented in Table 3.

Table 2

Descriptive Statistical Table of Information Behavior

Topic	I	II	III	IV	V	Average score
No.6 Frequency of use of generative AI tools	22	22	18	5	1	2.13
No.9 Information seeking: help with search strategy development	3	19	17	24	5	3.13
No.10 Information seeking and encountering: help with enlightened search	2	9	19	32	6	3.46
No.11 Information sharing: Changes in willingness to share information	10	20	24	7	7	2.72
No.12 Information use: help to improve the accuracy of user personalized recommendations	5	16	30	15	2	2.90
No.13 Informaiton use: help with teaching practice	2	20	19	23	4	3.10
No.14 Information use：help to organize information and reduce users' inquiry response time	8	14	19	21	6	3.04

Table 3

Prioritization of Chatbots

Sorting changes	Rangeability	Frequency（Rate）	Total
Sort Advance	3	15（22.06%）	55.89%
	2	13（19.12%）	
	1	10（14.71%）	
Sort unchanged	0	30（44.12%）	44.12%

Combining the results in Tables 2 and 3, it is evident that the frequency of using generative AI tools by librarians in mainland China is generally low. The overall situation is far from reaching the stage of being able to skillfully use the tools in production and life, and letting the tools

participate in the work in depth. However, the tools still have a certain impact on the librarians' information behavior.

Regarding information seeking and encountering, over half of the librarians interviewed (55.89%) reported a greater inclination to use generative AI tools since their emergence. Of those, 22.06% reported a significant change in their priority selection of the retrieval tool. This is according to survey No.9. The survey results show that 67.65% (46/68) of the interviewed librarians believed that the tools were moderately helpful in optimizing retrieval strategies. The mean score of No.10 indicates that the tools help librarians conduct broader, deeper, and more illuminating searches to support data-driven decision making.

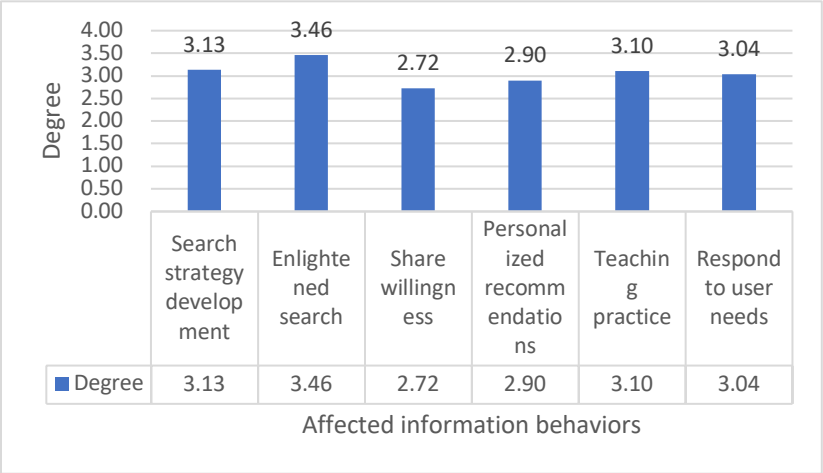
Information sharing behavior refers to the librarians' sharing of acquired information and resources to others in their daily work to help them solve problems and improve work efficiency. This study investigated the willingness of librarians to share information and found that the mean score for this item was 2.72, indicating a low level of willingness. Most of the interviewed librarians reported that their willingness to share information had not significantly changed after the emergence of the tool. The interviewed experts indicated that they did not frequently share AIGC directly, considering the issue of content accuracy.

With the rise of digitization in libraries, librarians are increasingly focused on providing personalized information services and meeting individual needs. According to Table 2, No.12, 44.12% (30/68) of librarians reported that these tools are helpful in improving the accuracy of personalized recommendations for users. Additionally, many librarians believe that these tools greatly assist in teaching practices and reduce the time needed to respond to reference inquiries.

Figure 3 shows the extent to which various information behaviors were affected. To enhance the questionnaire data, this study consulted senior experts to discuss changes in the functions of librarians. The three experts agreed that, at this stage, the tool has not been widely used by domestic librarians. They also noted that most of the librarians' tasks have remained unchanged, with only retrieval, education, training, and user consultations being significantly affected. The tool can provide librarians with inspiring ideas, improve retrieval efficiency, and expand the retrieval scope. The tool can enhance librarians' search efficiency, expand the scope of their search, and provide them with new ideas. It can also shorten the time librarians spend on collecting reference materials for educational and training purposes, and help them provide users with richer classroom content. These benefits align with the statistical results of Part 2 of the questionnaire.

Figure 3

Librarians' Affected Information Behavior



Results of Part 3

Part 3 discusses the ethical considerations surrounding the use of generative AI tools by librarians and how libraries and librarians respond to challenges. No.15-17 is a Likert scale item, and the descriptive statistical data are shown in Table 4. No.18 is an open question.

Table 4

Descriptive Statistics of Librarian Information Ethics

Topic	I	II	III	IV	V	Average score
No.15 Concerns about user privacy leakage	5	4	13	24	22	3.79
No.16 Evaluation of the credibility of tools	1	7	45	13	2	3.12
No.17 Verification of the accuracy of information	3	4	10	33	18	3.87

In information ethics, concern about reader privacy is reflected in No. 15. The data shows that 46 (67.65%) librarians are very concerned about reader privacy issues, while only 9 (13.23%) librarians are less concerned about privacy and security. No. 16. The text discusses the evaluation of a tool's accuracy and trustworthiness by librarians. According to the study, 45 out of 68 librarians (66.18%) rated the accuracy and trustworthiness of the tool as average. The study also examined how often librarians validate content generated by the tool and found that only 7 librarians validate less, while most librarians do not directly reuse machine-generated content.

No.18 identified the factors that impact the widespread adoption of generative AI tools by librarians. The concerns of librarians can be classified into five main categories: 1) accuracy of generative tool content, 2) information security and data privacy, 3) research integrity, 4) network access limitations, and 5) cost. The initial three items pertain to information ethics, suggesting that the librarians possess a certain level of ethical awareness and have considered approaches to addressing ethical dilemmas.

To obtain a clear understanding of how libraries and librarians address ethical challenges, this study gathered expert opinions. The following is a summary of those opinions. At the library level: 1) Formulate relevant policies, guidelines and codes of conduct, and clearly stipulate the ethical principles and requirements that librarians should abide by in the process of information processing and service; 2) Popularize the basic principles of generative tools and give tips on the risk points of using them. The current artificial intelligence technology is a "black box" in front of the user, only by understanding its working principle can we know the risk points when using the tool; 3) Training in the scientific use of tools. At the librarian level: 1) test the tools repeatedly, discover and solve problems from the application process, summarize experience and discuss them extensively; 2) Actively participate in ethics-related education and training and case discussions, take a prudent attitude towards user information in the work, and strictly ensure that no privacy is disclosed; 3) Enhance the ability to screen and discern information, and deliberately cultivate critical thinking skills.

DISCUSSION

The emergence of generative AI has impacted information practitioners, such as librarians, and has affected their information behaviors. This study adopts a combination of survey questionnaires and interviews to investigate 68 librarians in mainland China. The findings indicate that among the four types of information behaviors, information seeking, information encountering, and information use behaviors are more affected, while information sharing behaviors are less affected. Additionally, the study proposes six suggestions for addressing ethical challenges, including formulating policies, promoting understanding of the tool's working principle, providing training on tool usage, fostering critical thinking among librarians, etc.

Leo S.Lo from the University of New Mexico surveyed members of the Association of Research Libraries (ARL) to determine the impact of generative AI technology on library services[1]. The survey focused on how ARL members anticipate the technology will enhance library services in the next 12 months. The results showed that the future applications in libraries are likely to be in the areas of chatbots for user support, research data analysis, personalized content recommendations, etc. This supports our study's findings that tools can aid librarians in reducing user response times and improving the precision of personalized recommendations. While Leo's study takes a macro perspective on library construction, our study focuses on analyzing the information behaviors of librarians, who are essential components of the library system. The findings can provide references for the implementation of intelligent library services.

During the interviews, the interviewed experts also discussed the impact of generative AI technology on librarians, focusing on the negative impacts of the technology: 1) Tool usage may lead to thinking inertia among researchers, fostering dependency on the tool. Several universities and journals in the United States have placed explicit restrictions on the use of ChatGPT. How can this negative impact be mitigated? It requires librarians to deeply contemplate the issues before using the tools, relying on them only for expansion and supplementation, rather than solely depending on the tool's answers; 2) The tool shortens the time for librarians to obtain answers but requires more effort in information discernment. Moreover, the quality of generated answers is closely related to the manner of questioning, demanding higher questioning skills from librarians;

1 https://www.arl.org/blog/quick-poll-results-arl-member-representatives-on-generative-ai-in-libraries/

3) Tool usage may cause professional anxiety among librarians, particularly older ones who may not be as accepting of new knowledge and technologies as their younger counterparts, and may face pressure to learn new skills. There is concern among some librarians that they may be replaced by machines in the future; 4) Librarians' misjudgment of content may have adverse effects on final decisions. Senior management often consults librarians for professional opinions during decision-making. If librarians rely on generative AI technologies, this may lead to errors in judgment.

In addition, our study has some limitations due to the small sample size, which may affect its generalizability. We plan to expand our research subjects in the coming months and collect data from social networks, which can also reflect librarians' attitudes towards new technology. In the future, we will broaden our survey channels and combine multidimensional data to produce more representative results.

CONCLUSION

This study aims to investigate the impact of generative AI technology on the information behaviors of librarians. It examines both the positive and negative effects of the technology and explores how libraries and librarians can respond to the ethical challenges it poses. The study collected data from librarians in mainland China and provides a valuable reference for LIS scholars researching this area.

Generative AI technology has not yet been widely applied in the library field and is still in the exploratory stage of assisting librarians' work. However, most of the interviewed librarians have a positive attitude towards the technology's potential for large-scale application and are looking forward to its future development. From the present to large-scale application, progress in technology is not the only requirement. Librarians' information literacy is also crucial. Equally important is the development of policies around user privacy, intellectual property rights, and academic integrity by the state and society. Norms for the use of technology, including generative AI products, must be established with clear requirements. In the future, the norm in all fields will be human-machine coexistence, and scholars will continue researching the pursuit of a balance between technology and ethics.

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