

## Generative Artificial Intelligence applications in Academic Library Services: A systematic review of ChatGPT, Gemini and Large Language Models (2022-2026)

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### Abstract

Generative artificial intelligence (GAI) is rapidly transforming academic library services by increasing access to information, support for research and the involvement of users. This study systematically reviewed the literature on generative artificial intelligence applications in academic libraries published from the years 2022 to 2026. A search of the Scopus database carried out on 6 June 2026 found 56 records, 35 of which met the inclusion criteria and were selected for analysis under the PRISMA Framework.

A thematic analysis identified six main areas of use: application: reference and chatbots services, information and AI literacy, research support services, cataloguing and metadata creation, knowledge management, outreach and professional development, and ethical, legal, and professional issues.

The findings show that generative artificial intelligence tools such as ChatGPT, Gemini, and other large language models are increasingly being used to support library operations, educational activities and research services. However, there are still serious problems of misinformation, bias, privacy, copyright and academic integrity.

The literature review shows that librarians are playing an increasing role in promoting the responsible use of AI and on raising public awareness. The study highlighted the need for ethical and long term implementation in academic libraries and concluded that generative artificial intelligence should complement rather than replace the expertise of librarians.

**Keywords:** Generative artificial intelligence, Academic Libraries, ChatGPT, Large Language Models, AI Literacy, Reference Services, Research Support, Systematic Review.

### 1. Introduction

Academic libraries have been undergoing a constant technological change for many years. Libraries are implementing new technologies to enhance information accessibility and service delivery, from the implementation of digital repositories and integrated library systems to launch cloud platforms and discovery services. The recent advancement of generative artificial intelligence (GAI) is another significant development in this ongoing digital transformation.

Generative AI refers to artificial intelligence systems that use patterns in large database to produce text, images, audio, code, and multimedia output. Generative AI can produce human-like responses and engage in complex human-human interaction, in contrast to traditional AI applications that are primarily concerned with prediction, classification, and automation. Large language models (LLMs)

have gained international attention since the ChatGPT OpenAI publications at the end of 2022. It also showed how artificial intelligence-powered chat systems could revolutionize information-intensive works (OpenAI, 2023).

The library and information science (LIS) field has shown a strong interest in the rapid adoption of generative artificial intelligence. Historically, libraries have been essential in facilitating access to reliable information, promoting information literacy, facilitating scholarly communication and supporting research activities. As a result, librarians are using generative artificial intelligence technologies to improve existing services while addressing ethical and professional issues associated with their use (Lund and Wang, 2023).

The potential of generative artificial intelligence in academic libraries has been the subject of numerous studies. Virtual reference services, chatbots with artificial intelligence capabilities, information literacy training, research consultation, metadata creation, subject indexing, collection development, and administrative support are some of these services (Lo, 2023). In addition to these research guides, generative artificial intelligence systems are used for the development of educational material, literature reviews and user support for navigating in a complex information environment.

Despite these advantages, the adopting generative artificial intelligence in libraries raises serious concerns. One of the most widely discussed issues is the phenomenon of artificial intelligence hallucinations, in which systems produce false or incorrect information and then pass it off as fact (Dwivedi et al. (2023). Other issues include algorithmic bias, privacy risks, unclear copyright, disinformation, and academic integrity (Cotton et al. (2024). These concerns are particularly relevant in academic libraries, where the core values of the profession are accuracy, reliability and ethical information.

The rapidly expanding field of generative artificial intelligence research in libraries requires a systematic synthesis of existing literature review. A thorough understanding of how generative artificial intelligence affects academic library services is still lacking, although individual studies have explored specific applications, tools, and difficulties. This study addresses this gap by systematically reviewing the research published from 2022 to 2026 and identifying the key themes, opportunities, challenges and directions to be taken in the future.

### **1.1 Objectives of the study**

The objectives of this study are:

1. To identify the main applications of artificial intelligence for academic libraries.
2. To explore the benefits of adopting generative artificial intelligence in academic libraries.
3. Analyze the problems and ethical concerns reported in the literature.
4. Identify future research directions and impacts on library professionals.

### **1.2 Research Questions**

Q1: How is generative artificial intelligence being used in academic library services?

Q2: What benefits of using generative artificial intelligence in academic libraries are reported in the literature?

Q3: What challenges and ethical concerns arise with the adoption of artificial intelligence?

Q4: What future directions for implementing generative artificial intelligence in academic libraries?

## **2. Literature Review**

### **2.1 Generative artificial intelligence: concept and evolution**

Since its early applications in expert systems, machine learning and automated information retrieval, artificial intelligence has evolved considerably. The development of deep learning and neural network architectures has enabled the emergence of generative artificial intelligence systems that can produce sophisticated, human-like content. Large-scale language models such as GPT-4, Gemini, Claude, and Copilot are trained on large text files and can generate contextually relevant answers in a variety domain (OpenAI, 2023).

The ChatGPT launch was a turning point in public awareness and acceptance of the generative artificial intelligence technologies. Educational institutions, researchers, enterprises businesses, and information professionals have quickly begun to explore its capabilities and impacts. According to Kasneci et al. (2023), Artificial intelligence has the potential to transform the learning, research and knowledge-creation processes by providing personalized support and facilitating access to information.

### **2.2 Artificial Intelligence in libraries**

Libraries have a long history of adopting technologies related to artificial intelligence. Early implementations focused on information retrieval systems, recommendation engines, automatic indexing, and digital library management. Recently, machine learning techniques have been used to improve the relevance of searches, the quality of metadata and the user experience (Cox et al., 2023).

The advent generative artificial intelligence has broadened the scope of AI applications in libraries. Unlike earlier systems, which mainly automated routine tasks, the generative AI system can interact directly with users through conversational interfaces, create content and provide personalised information support. As a result, academic libraries are increasingly assessing how these technologies can be complementary to traditional library services.

### **2.3 Generative AI in academic libraries**

The use of generative artificial intelligence in various aspects of academic library practice is becoming increasingly popular, according to literature. Virtual reference services are among the most researched applications. Researchers have explored how ChatGPT and related tools can improve the availability of services, facilitate the search for information and provide fast answer to users' questiones (Lo, 2023).

Another important area of application is in the teaching information literacy. Libraries are developing AI-literacy programs to teach students how to critically assess AI-generated content, create useful prompts, and understand the limitations of generative artificial intelligence. The idea of rapid prototyping in increasingly important in information literacy frameworks (Lo, 2023).

Research support services are another fast-growing sector. Research looked at the use of using generative artificial intelligence for research advice, literature search, citation support and support for systematic literature review. These tools could increase their effectiveness, but there are still concerns about misinformation and false claims (Lund et al. 2023). The use of artificial intelligence in metadata creation and cataloging has also been the subject of number of studies. According to preliminary information, LLM may help in the assignment of subject, improvement of metadata, and the descriptive cataloging; however, expert supervision is still required to ensure quality and consistency.

#### **2.4 Ethical and professional challenges**

One of the most important topics in the literature is the ethical implications of artificial intelligence. Researchers have identified a number of issues that require careful consideration. First, when AI-generated content is used without verification, false claims and disinformation could compromise the reliability of the library services (Dwivedi et al. 2023). Second, algorithmic bias may affect the equitable access to information and perpetual social inequities.

Third, privacy issues arise when people interact with artificial intelligence systems that collect and use personal information. Finally, the copyright, , and academic integrity issues continue to be debate in the education and library communities (Cotton et al. 2024). Many researchers therefore argue that librarians should be actively involved in promoting ethical use of artificial intelligence and in developing institutional policies to support it.

### **3. Methodology**

The PRISMA 2020 framework guided the approach to the systematic literature review used in this study. The aim of the review was to identify, assess, and synthesize research on applications of generative artificial intelligence in academic library services.

#### **3.1 Data Source**

The Scopus has been chosen as the primary literature source for its wide coverage of peer-reviewed journals, conference proceedings, and scholarly publications in the library and information science fields. The bibliographic data for this review were retrieved from Scopus on June 6, 2026 using a predefined search strategy.

#### **3.2 Search Strategy**

Search strategy combines the following keywords related to generative AI and academic libraries:

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TITLE-ABS-KEY(( ChatGPT OR Gemini OR Claude ) AND ( "Academic Librar*" OR "University Librar*" ))  
AND ( LIMIT-TO ( DOCTYPE,"ar" ) ) AND ( LIMIT-TO ( LANGUAGE,"English" ) ) AND ( LIMIT-TO ( SRCTYPE,"j" ) ) AND ( LIMIT-TO ( PUBSTAGE,"final" ) )
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#### **3.3 Inclusion Criteria**

The review included English-language, peer-reviewed journal articles published between the years 2022 and 2026 and indexed in Scopus. Studies on the use generative artificial intelligence such as ChatGPT, Gemini, Claude, large-scale language models (LLMs), artificial intelligence chatbots and AI literacy in academic library have been included.

### 3.4 Exclusion Criteria

Studies were excluded if they were non-journal and non-peer reviewed publications, published outside the period 2022 - 2026, non-English-language, addressed outside the library, or dealt with artificial intelligence without specific reference to generative artificial intelligence in academic libraries.

### 3.5 Screening Process

A total of 56 records were identified through Scopus. Following title screening and eligibility assessment, 35 studies were included in the final review.

Screening Stage	No. of records
Records identified from Scopus	56
Duplicate removes	0
Record screened	56
Record excluded after title screening	8
Articles assessed	48
Irrelevant articles excluded	13
Studied included in review	35

Table 1: PRISMA screening process

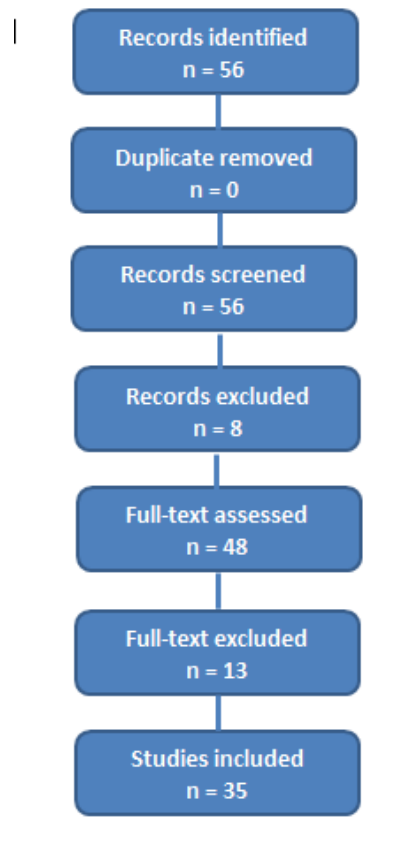


Figure 1: PRISMA 2020 flow diagram for study selection process

Source: Prepared by the author based on the PRISMA screening of Scopus record (2022-2026)

### 3.6 Data Analysis

The synthesis of the findings of the included studies was done using a thematic analysis approach. The studies were peer reviewed manually and divided into six themes according to their main focus - reference services and chatbots, information literacy and AI literacy, research support services, cataloguing and metadata creation, knowledge management, outreach and career development, and ethical, legal and professional challenges.

## 4. Results and Discussion

### 4.1 Overview of studies included

The systematic review included 35 studies published between 2022 and 2026, which explored the use of generative artificial intelligence (GAI) in academic libraries. The growing number of publications over this period reflects the growing interest in the library and information science community to explore the opportunities and impacts of large language models (LLMs) in particular ChatGPT, Gemini, Bard, Claude, and chatbots with artificial intelligence.

The studies included were grouped in six main thematic areas: reference services and chatbots (10 studies), information literacy and artificial intelligence literacy (8 studies), research support services (4 studies), cataloguing and metadata creation (1 study), knowledge management, Outreach and professional development (5 studies), and ethical, legal, and professional challenges (7 studies). The

thematic distribution shows that reference services and information literacy remain the main areas where academic libraries experiment with the technologies of generative artificial intelligence.

Themes	Number of Studies
Reference services and chatbots	10
Information literacy and AI literacy	8
Research Support Services	4
Cataloguing and metadata creation	1
Knowledge management, Outreach and professional development	5
Ethical, legal, and professional challenges	7
Total	35

Table 2: Distribution of study theme

#### 4.2 Reference services and chatbots

In the reviewed literature, reference services were found to be the most extensively studied area of application. 10 studies inspected the use of generative artificial intelligence in chatbots, in user support systems, virtual assistance, and in reference services. Peer-reviewed research has consistently shown that chatbots powered by artificial intelligence can reduce the workload associated with routine information requests, extend the availability of services beyond library hours, and provide immediate answers to users' queries.

Several studies have shown that generative AI systems can answer commonly asked questions, provide advice and direct users to relevant information sources. Libraries that have implemented personalized chatbot solutions have reported increased availability and responsiveness of their services. These systems have been particularly useful to assist users on weekends, evenings, busy periods.

The results also show that conversational AI can increase user engagement by offering tailor-made interactions and reducing barriers to access to information. Artificial intelligence systems are often perceived by researchers and students as useful sources of preliminary data and support. However, the reviewed studies also highlighted important weaknesses. Generation-alike systems have sometimes generated false citations, misinterpreted complex research questions, and generated incorrect information. These problems were particularly evident when users sought academic information or advice in specific areas.

#### 4.3 Information literacy and AI literacy

Information literacy and AI literacy was the second largest theme, with eight studies on the teaching applications of generative artificial intelligence. The reviewed studies show that the widespread availability of AI-generated content has fundamentally changed the landscape of information literacy landscape in higher education.

Traditionally, information literacy programmes have placed great emphasis on the identification, assessment, and ethical use of information. However, the growing use of generative artificial intelligence tools by students has brought new challenges and new skills. The importance of AI literacy -which includes understanding how AI systems generate information, recognizing their

limitations, assessing the content produced by AI and using AI responsibly – has been repeatedly emphasized in the peer reviewed papers.

In literature, prompt engineering become a particularly important theme. Several studies have stressed the need to teach how to create effective prompts to elicit accurate and meaningful answers from artificial intelligence systems. The results show that agile design is emerging as a key digital competence, alongside traditional search and evaluation skills.

Peer-reviewed studies have also shown that the excessive reliance of students on content generated by artificial intelligence is a growing cause for concern. In response, libraries have developed research guides, seminars and educational materials to support critical interaction with content produced by artificial intelligence. Many institutions are starting to integrate AI literacy into their existing information literacy frameworks to help students identify deception, verify sources and critically assess the reliability of AI output. The results show that academic libraries are increasingly leading the way in teaching AI literacy and are adapting their curricula to keep pace with fast-changing technology landscape.

#### **4.4 Research Support Services**

Research support services were another important area of the adoption of generative artificial intelligence. In particular, 4 studies looked at how artificial intelligence technologies could help in the areas of systematic review, research advice, literature search and scholarly communication. According to peer reviewed studies, generative artificial intelligence can improve various phases in the research process. Researchers use artificial intelligence tools to create search strategies, find keywords, summarize literature, refine research questions, and explore new topics. These applications have been found to increase productivity and reduce the time needed for pre-research tasks.

The value of generative artificial intelligence to facilitate systematic search and discovery of literature has been demonstrated in several studies. Artificial intelligence-generated suggestions often helped researchers find related concepts and alternative search terms that they might not even considered. In addition, artificial intelligence have been found to be useful in compiling complex academic materials, speeding up the understanding of large amount of data.

Reliability issues have often been raised despite these advantages. According to the peer reviewed studies, one of the most important problems in advancing of AI-assisted research is the hallucinated attributions. Artificial intelligence systems some time generate links that appear authentic but cannot be verified in academic database. Such error poses a serious threat to academic integrity and the equality of research. Therefore, peer reviewed studies recommended that researchers compare all data generated by AI with reliable academic sources.

#### **4.5 Cataloguing and metadata creation**

Cataloguing and creating metadata has received relatively little attention in the reviewed literature, with only one study specifically examining this field. Although there are not many studies, the results show that there is much scope for improvement.

The peer-reviewed study looked at use of artificial intelligence to assign Library of Congress subject headings (LCSH), to produce summaries, and to help with metadata improvement tasks. The findings showed that demonstrated that artificial intelligence systems can assist catalogers by generating summaries, recommending terms, and helping with metadata enhancement tasks. These features could increase productivity and reduce the time needed to complete standard technical tasks.

However, the study also found identified weaknesses in terms of consistency, accuracy, and compliance with the cataloguing standards. The metadata generated by the artificial intelligence required extensive human editing it lacked specificity. As a result, expertise in cataloging is still needed to ensure that the requirements set out are met and that metadata is maintained. The results show significant potential for future research and innovation, especially in the areas of artificial intelligence-assisted metadata creation, automated classification, and integration with library management systems, although cataloguing is a relatively unexplored application area at present.

#### **4.6 Knowledge management, outreach, and professional development**

Five studies have explored the role of generative artificial intelligence in knowledge management, library outreach, communication strategies and professional development.

According to the findings, artificial intelligence technologies can make a significant contribution to institutional knowledge management and to the efficiency of organization. According to a many studies, libraries can use artificial intelligence to store organizational memories, produce reports, organize institutional knowledge, and create documentation. Moreover, research guides, training materials and user-friendly content were found to be supported by artificial intelligence tools.

The use of AI-generated content in newsletters, social media campaigns, promotional material, and event communication was highlighted in the peer reviewed information and marketing studies. Libraries reported use of generative artificial intelligence tools for content creation and communications management.

Professional development was another key issue. Peer-reviewed studies have shown that librarians need new skills in technology management, rapid prototyping, ethical assessment, and AI literacy. The successful integration of artificial intelligence technologies into library services will depend on professional development and training of the staff. The results show that, in addition to user-facing services, generative artificial intelligence affects the internal functioning of academic libraries, communication processes and the role practitioners.

#### **4.7 Ethical, Legal, and Professional Challenges**

Ethical, legal and professional concerns were addressed almost all the studies included, making them one of the most universal themes in the review. The reviewed literature consistently identified as major barriers to the adoption of generative artificial intelligence delusions, bias, privacy concerns, copyright issues, and academic integrity. The most frequently reported issue was hallucinations. According to numerous studies, artificial intelligence systems generate false responses when they are asked to respond to a question. These errors have a negative impact on academic communication and can undermine the confidence in libraries.

Privacy and data security concerns have also been widely discussed. User interaction with artificial intelligence platforms may include personal, academic or research information. Libraries therefore need to establish strong governance frameworks and ensure compliance with institutional data protection policies is respected. Copyright and intellectual property issues remain unresolved in many jurisdictions. Peer-reviewed studies have highlighted the uncertainties surrounding the ownership of AI-generated content, the attribution of authorship and the use of copyrighted material in AI training datasets. These issues remain a constant challenge for libraries and educational institutes.

Academic integrity was identified as an important issue. Increasing use of attribution by students raises important questions about authorship, originality, plagiarism, and ethical scholarship. Peer reviewed studies have highlighted the need for libraries to be actively involved in institutional policy-making, promoting ethical research practices, and responsible use of attribution.

#### **4.8 Synthesis of Findings**

A summary of the 35 studies included how that generative AI is rapidly transforming the services of academic libraries. Reference services, information literacy, training and research support activities are the most prominent areas of adoption. Increasingly, libraries are using artificial intelligence technologies to improve accessibility, increase user engagement and make service provision more efficient.

At the same time, the peer reviewed studies consistently underline that generative artificial intelligence should be seen as a complement to, rather than a substitute for professional librarians. Human expertise remains essential to ensure the quality of the information, maintain ethical standards, and support complex research activities.

The findings also show that academic librarians are taking new roles as AI educators, facilitators, trainers and policy consultants. As the development of generative AI continues, academic libraries will play a key role in helping users navigate an increasingly complex information environment while promoting the responsible and ethical use of systems that enable AI.

#### **5.1 Reimagining the Role of Academic Librarians**

One of the most important consequences of the review is the change in the role of the librarian. Traditionally, librarians have been information providers, stewards of resources and facilitators of learning. However, the integration of generative artificial intelligence extends this responsibility to include roles such as AI educators, technology facilitators, digital literacy trainers, and policy consultants. Similar findings were reported in studies investigating the impact of the ChatGPT on academic librarianship and on academic communication (Lund & Wang, 2023; Lund et al., 2023).

Studies reviewed how that librarian is increasingly expected to help users understand the strengths and limitations of artificial intelligence tools. This requires that librarians develop skill in rapid prototyping, AI literacy, critical assessment of content created by artificial intelligence, and ethical use of AI (Lo, 2023).

#### **5.2 Strengthening Information Literacy and AI Literacy Programs**

The review shows that academic libraries are in unique position to lead initiatives in the field of AI literacy in institutions. Information literacy programmes need to evolve beyond traditional search and rating skills to include AI-generated information-related competencies. This finding is in line with recent studies highlighting the importance of artificial intelligence literacy and rapid engineering in higher education (Lo, 2023; Kasneci et al., 2023).

Libraries should develop AI-based frameworks for AI literacy, which address understanding AI systems, assessing AI-generated content, identifying AI-generated hallucinations, and promoting responsible use of artificial intelligence (Kasneci et al., 2023).

### **5.3 Enhancing Research Support Services**

The findings show that Generative AI can make a significant contribution to the provision of research support services. Using artificial intelligence to search for literature, generate keywords, summarize content and consult researchers can increase efficiency and reduce the time needed for preliminary research activities. Similar benefits were found in studies exploring the use of generative artificial intelligence in academic communication and research workflow (Dwivedi et al., 2023; Lund et al., 2023).

However, the outputs produced by artificial intelligence require careful verification, as false references and inaccurate information remain a common concern (Lund et al., 2023).

### **5.5 Developing Institutional AI Policies**

The ethical and legal concerns identified by the review underline the need for a comprehensive institutional policy on artificial intelligence. Libraries should work with university administrators and faculty to develop clear guidelines for the use of artificial intelligence. Previous studies have also highlighted the importance of governance frameworks, transparency, and ethical supervision in the implementation of artificial intelligence (Dwivedi et al., 2023; Cotton et al., 2024).

### **6. Future Research Directions**

The review identified several gaps in the existing literature. Although most studies focus on exploratory applications of generative artificial intelligence in academic libraries, research is needed to explore its long-term impact on library services and institutional practices. As pointed out by Kasneci et al. (2023) and Dwivedi et al. (2023), further evidence is needed to understand the wider implications of generative artificial intelligence, and Lund and Wang (2023) stressed the need to continue exploring the uptake of AI libraries. Therefore, future research should focus on user confidence, AI-assisted cataloguing, ethical management, AI literacy assessment, and the integration of generative AI with libraries discovery platforms.

### **7. Conclusion**

The systematic review analyzed the 35 articles published between 2022 and 2026 to investigate the use of Generative artificial intelligence in academic library services. The results display that reference services, information literacy, research support, knowledge management, and library information initiatives are increasingly use generative artificial intelligence tools, in particular ChatGPT and other Large Language Models (LLMs).

According to the literature review, generative artificial intelligence has great potential to improve the availability of services, increase operational efficiency, and facilitate research, teaching, and learning. Reference services and information literacy were recognized as the most common application areas, which points to the growing use of artificial intelligence in user assistance and training programmes.

However, the review also identified significant barriers such as risks to academic integrity, bias, privacy issues, copyright issues and delusions. These results highlight the need for institutional governance frameworks, human oversight and accountable implementation to ensure that AI technologies are used effectively and responsibly in academic libraries.

Generative artificial intelligence should be seen as supplementing, rather than replacing, knowledge in libraries. Academic libraries play key role in promoting artificial intelligence literacy, promoting responsible use of artificial intelligence and guiding users in the assessment of AI-generated information. As AI technologies continue to evolve, libraries need to balance innovation with professional values to maximize their benefits and to address emerging ethical and operational challenges.

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