


## AI ChatGPT Applications in Libraries - Challenges and Opportunities

### Kütüphanelerde ChatGPT Uygulamaları - Zorluklar ve Fırsatlar

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#### ABSTRACT

The purpose of this study was to explore the impact of and effect on library services of the newly launched AI-based ChatGPT. The study presents an analysis of ChatGPT applications in environments such as libraries and information centers. Qualitative methodology was applied in this study. The data collection tool was that of interviews which were conducted with ChatGPT. Six open-ended questions were asked of ChatGPT about the library and information management performance.

The findings show that ChatGPT is a helpful tool for libraries and their users. ChatGPT is more advanced compared to other chatbots. It supports information access, the fastest retrieval of information, resource development, reference services, library instruction, and research activities. This is an innovative study based on interviews and responses taken from ChatGPT. A few studies were previously conducted with ChatGPT in the context of library and information services. However, these did not cover the six questions discussed in this study. ChatGPT has the latest chatbot. This study helps librarians and library policymakers acquire this technology and make fair use of ChatGPT in library services.

**Keywords:** ChatGPT, Chatbot, Natural Language Processing (NLP), Artificial Intelligence, Chat References, Information retrieval


#### ÖZ

Bu çalışmanın amacı, yeni başlatılan yapay zeka tabanlı ChatGPT'nin kütüphane hizmetleri üzerindeki etkisini ve etkinliğini araştırmaktır. Çalışma, kütüphaneler ve bilgi merkezleri gibi ortamlardaki ChatGPT uygulamalarının bir analizini sunmaktadır. Bu çalışmada nitel yöntem uygulanmıştır. Veri toplama aracı ChatGPT ile gerçekleştirilen görüşmelerdir. ChatGPT'ye kütüphane ve bilgi yönetimi performansı hakkında altı açık uçlu soru sorulmuştur. Bulgular, ChatGPT'nin kütüphaneler ve kullanıcıları için yararlı bir araç olduğunu göstermektedir. ChatGPT diğer chatbotlara göre daha gelişmiştir. Bilgiye erişimi, bilgiye en hızlı şekilde ulaşmayı, kaynak geliştirmeyi, danışma hizmetlerini, kütüphane eğitimini ve araştırma faaliyetlerini destekler. Bu çalışma, ChatGBT ile yapılan görüşmeler ve ChatGPT'den alınan yanıtlara dayanan yenilikçi bir çalışmadır. Daha önce ChatGPT ile kütüphane ve bilgi hizmetleri bağlamında yapılan birkaç çalışmanın varlığı söz konusudur. Ancak bunlar bu çalışmada tartışılan altı soruyu kapsamamaktadır ChatGPT en yeni chatbot'a sahiptir. Sonuç olarak bu çalışma, kütüphanecilerin ve kütüphane politika yapımcılarının bu teknolojiyi edinmelerine ve kütüphane hizmetlerinde ChatGPT'yi adil bir şekilde kullanmalarına yardımcı olabilir.

**Anahtar Kelimeler:** ChatGPT, Chatbot, Doğal Dil İşleme (NLP), Yapay Zeka, Sohbet Referansları, Bilgiye Erişim

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## 1. Introduction

Natural Language Processing (NLP) is a branch of artificial intelligence that “helps computers understand, interpret, and manipulate human language” (Nguyen, Le, Hoang, & Nguyen, 2021, p. 1). According to Edgcomb & Zima (2019), although Natural Language Processing arose in the 1970s, subfields of computer science and linguistics are still dedicated to what the authors refer to as the “nuances of NLP” (p. 347).

NLP-based chatbot applications are becoming more prominent in different professions and fields such as marketing. These applications are used as conversational agents for the purpose of providing customer care in fields such as product design, hotel management, tutor accounting, auditing, research, etc. There are thousands of chatbots built and used in different fields. For example, thirty-four thousand chatbots were designed and used for various purposes all over the world in 2016 (Dale, 2018).

NLP supports many ways to search for information in libraries like a virtual assistant, chatbot, digital assistant, conversational assistant/agent, and translation services. These are very common features related to NLP which are used in the libraries. A recently launched AI-based chatbot which is known as AI "ChatGPT" has gained popularity all over the world. ChatGPT also helps in programming and in the provision of coding-related facilities for its users. It has a big storage capacity for data. Initially freely available for the individual, in the future, Open AI will charge individuals and institutional users. ChatGPT is used for marketing, sales, customer services (call centers), Media and Journalism (Pavlik, 2023), higher education, libraries, and other professions. The function of a chatbot is to communicate with the users while listening to their queries, complaints, feedback, and responses. ChatGPT has a significant impact on library services and improves library efficiency.

## 2. Literature Review

Chatbot is considered one of the advanced features of AI. The first chatbot, ELIZA, was developed in 1966 at the MIT Artificial Intelligence Laboratory and was one of the first attempts to simulate human conversation (Weizenbaum, 1966). Several Chatbots were built over the years in various phases in keeping with the technology at the time. The ELIZA, considered to be the first AI-based chatbot, was launched in 1966. The ALICE (Artificial Linguistic Internet Computer Entity) became the next online chatbot after ELIZA in 1995. The ALICE did not have an intelligent feature. It could not generate human expression. Chatbot is the shorter form of chat robot. It can perform the task of voice input and voice output.

Chatbot features gained popularity two decades ago (between the years 2001 and 2010) when different messengers were introduced by America Online (AOL), Microsoft (MSN) and Yahoo Messengers. These chatbots are used for conversation for daily tasks. These tasks are performed under human-computer interaction and machine intelligence. Advanced and developed artificial intelligence chatbots have been produced in the last decades and gained popularity when the renowned company Apple, considered to be the founder of the personal assistant chatbot, launched Siri in 2010 (Siri, 2020). Users make inquiries and have conversations with it through Messenger applications using voice commands. These include integration with audio, video, and image files as well.

IBM designed IBM Watson as a chatbot, and it was launched in 2011. It could understand the natural human language well enough to beat two previous champions in the quiz competition ‘Jeopardy’. However, IBM Watson only understands the English language. IBM also expanded the chatbot service named IBM Health for doctors and physicians to diagnose diseases (Watson assistant, 2020). Amazon developed an Alexa device in 2019 used as a chatbot that can interact with humans. It also has the same features as IBM Watson and can chat and converse with human beings and respond to queries. Google built Google Assistant in 2012 and it helps Google users to support account setup. In 2016, it improved its service by developing a more interactive conversational interface delivering information predicting customer requirements. Google Bard was launched in an attempt to match ChatGPT.

### 3. Chatbot Applications in Libraries

ELIZA is considered to be the first chatbot and was designed in 1966. Later a second chatbot was launched in 1995. It is known as Artificial Linguistic Internet Computer Entity or ALICE and was designed by Richard Wallace. AI-based chatbot Xiaotu was built in 2011. Xiaotu is an AI-based chatbot invented and used in Chinese libraries. This chatbot responds to users' queries and has gained popularity (Yao, Zhang, & Chen, 2015). There are two types of conversational Chatbot used in libraries. Type I operates according to predetermined rules and can only respond to very specific commands/programs and not give answers outside of specified parameters. Type II is based on machine learning algorithms applying AI and NLP that can understand the text and answer accordingly (Sanji, Behzadi, & Gomroki, 2022). The library website is a prime location where AI-based chatbots are integrated with information services. Pixel is another example of an AI-based chatbot. It was developed and designed by the University of Nebraska-Lincoln libraries to provide general information about the library and help library users to locate library material (Allison, 2012). Rasa stack AI-based open-source chatbot was built under the natural language generations (NLG) as a conversational agent and is used in libraries as a reference service and conversational agent (Bagchi, 2020). In the COVID phase, Lehman College built a chatbot for their students with the name Lehman light chatbot to support their students and users (Ehrenpreis & DeLooper, 2022). The advantages of AI Chatbot applications are that they provide reference services in academic libraries (Nawaz & Saldeen, 2020). ChatGPT is used very intensively by students and library users. In the near future libraries and information centers will use ChatGPT to support their library users. In technical services ChatGPT helps in collection development, book recommendations for the library, language translation and cataloguing of library materials. In a systematic review study conducted by Yan, Zhao, & Mazumdar, et al. in 2023 it was stated that chatbot applications in libraries are in the early stages. However, new trends are very popular among librarians and library users. Academic libraries have introduced ChatGPT-based services to its users besides the librarian (Rigby, 2023).

### 4. ChatGPT

ChatGPT was developed using the first version of Generative Pre-trained Transformer (GPT) which was introduced in 2018. It was trained on a massive dataset of text from the internet and could generate human-like text.

In 2019, the second version of GPT (GPT 2.0) was released. It was an even bigger model than the previous one with over 1.5 billion parameters and could generate text that was often indistinguishable from text written by humans.

ChatGPT 3.0 (GPT) was launched by Open AI in November 2022 (Kirmani, 2022) and is considered one of the most advanced of its kind. Chatbot uses deep learning to produce human-like text. It can engage humans in a conversation and reply to the answers besides using information retrieved from search engines, web crawlers, or websites. It was designed with the programming language Python to search the answers from its past activities.

Chat Generative Pre-Trained Transformer (GPT) 4.0 was launched in March 2023 and is considered more advanced than all previous versions.

There is as yet scant literature on the topic of ChatGPT AI-based new technology and most of the initial information is found on the Open AI website with a little information found on different blogs. Regarding the application of Chatbot, an initial survey was conducted on academic and commercial applications (Zong & Krishnamachari, 2022). The literature revealed that chatbots have been used in different professions and industries since its innovation. Applications of chatbot in different tasks have become easy without human interaction.

A generative model is a type of model that generates new text based on existing data, as opposed to only classifying or predicting based on input data (Pavlik, 2023). Generative Pre-Trained Transformer (GPT) is a machine-learning model that uses unsupervised and supervised learning techniques to understand and generate human-like language (Radford, Narasimhan, Salimans, & Sutskever, 2018). Due to the adoption

of a generative pre-trained transformer machine learning model, this chatbot is called ChatGPT for short. ChatGPT is helpful in different domains of knowledge applications and in health sciences (Bio-Medical and Health Care) it has had a great impact on academic writing, publishing, plagiarism, and research (Zong & Krishnamachari, 2022). Chatbot is also used for math tutoring and auditing work. ChatGPT has potential application in libraries and information industry areas in the context of Discovery search interface, research, reference, information literacy and digital literacy, data literacy, copyright, academic writing, and plagiarism (Cox & Tzoc, 2023). Information Literacy session AI-based literacy was also introduced to users in libraries and educated them to extract information from ChatGPT and other AI Based chatbots (Dawa, Dhendup, Tashi, & Rosso, 2023).

The ChatGPT usage as a personal assistant, and reference support services were discussed (Verma, 2023). Researchers also described the advantages and disadvantages of ChatGPT. These include limited capability, lack of accuracy potential errors, privacy concerns and dependence on technology. A survey study was also conducted on academicians and information professionals about ChatGPT. 95.8% of respondents have an awareness about ChatGPT. Another study explored the usefulness of Artificial Intelligence in the workflow of the library mostly in reference queries and literature search (Pival, 2023). ChatGPT is one of the supporting tools for such activities.

## **5. Methodology**

This is a qualitative and exploratory study. Such a study method is used when new technology and phenomena lack information about the research topic (Creswell, 2003). These exploratory studies attempt to specify indicators and attributes of complex concepts in social science and allied subjects (Creswell, 2009). Researchers asked about the impact on the library services and related questions from Chat GPT and the responses are tabulated in the boxes.

The same methodology was used by Chen in 2023 and by Kirtania & Patra in 2023. The responses are discussed in the discussion section.

### **5.1. Objective of the Study**

The main objective of this study is to introduce ChatGPT applications in libraries and to explore and discover the possible areas where this technology is applicable.

### **5.2. Research Questions**

The following main research questions were used to carry out this research study.

RQ 1 Is there a ChatGPT application in information and library industries?

RQ 2 Which library and information services are helped by ChatGPT?

RQ 3 Can ChatGPT help with information retrieval for library users?

RQ 4 As a conversational agent can ChatGPT support reference services?

RQ 5 Is ChatGPT a threat to the library industry?

RQ 6 How does ChatGPT affect the library and librarians' jobs?

## **6. Libraries and Information Management Institutions**

Six open-ended questions were asked of ChatGPT and the answers are given in blocks.

Question No. 1

Human: How can ChatGPT be applied in Libraries and Information Management institutions?

AI: *“ChatGPT is an intelligent chatbot designed specifically for libraries and Information Management institutions. It is powered by the GPT natural language processing technology and combines it with a powerful AI chatbot platform for libraries and Information centers. It uses natural language processing to answer questions from library users and provides them with the information they need. It also has powerful features such as automatic FAQ recommendations and natural language understanding, as well as the ability to manage library chatbot conversations.”*

Question No. 2.

Human: Which library and information services are helped by ChatGPT?

AI: *“ChatGPT is helpful in a variety of library services, such as providing library users with better access to information, faster information retrieval, and more efficient customer service. Additionally, it can provide recommendations for further research, suggest library resources, and even allow for a conversational interface to help library users navigate the library's collections. It can also help librarians provide better library instruction, as well as help library staff members manage library chatbot conversations.”*

Question (3 & 4) ChatGPT functions as a conversational agent role in information retrieval and reference services.

Question No. 3.

Human: Can ChatGPT help library users with information retrieval?

AI: *“Yes, ChatGPT can help with information retrieval for library users. It can search for topics, keywords, and other information relevant to a library user's query and provide them with the information they need. Additionally, it can provide recommendations for further research, suggest library resources, and even allow for a conversational interface to help library users navigate the library's collections.”*

Questions No. 4

Human: As a conversational agent can ChatGPT support reference services?

AI: *“Yes, ChatGPT can help in reference services. It can answer questions from library users and provide them with the information they need. It is also able to provide recommendations for further research, suggest library resources, and even allow for a conversational interface to help library users navigate the library's collections. Additionally, ChatGPT can be used to provide help and guidance for library staff members, helping them to provide better customer service and reference services.”*

Question No. (5 & 6) ask whether there is any threat from ChatGPT to libraries and librarian jobs.

Questions No. 5

Human: Is ChatGPT a threat to the library industry?

AI: *“No, Chat GPT does not pose a threat to the library industry. On the contrary, it offers many advantages such as providing library users with better access to information, faster and more accurate information retrieval, and more efficient customer service. ChatGPT also helps library staff members provide better customer service and library instruction.”*

Questions No. 6

Human: Will ChatGPT threaten librarians' jobs in future?

AI: *No, ChatGPT will not threaten librarian jobs in the near future. In fact, it could help librarians by providing better access to information, faster information retrieval, and more efficient customer service. It can also help librarians provide better library instruction, as well as help library staff members manage library chatbot conversations. ChatGPT does not pose a threat to the library industry and librarian jobs. Technologies are always helpful to the human being and ChatGPT will increase library efficiency and speedy services. Chatbot engages library users so that the librarian can perform other tasks.*



## 7. Discussion

Chatbot provides a variety of opportunities in various fields such as Education, Health, Research, Business, Marketing, and Journalism. It also provides great benefits to information management centers and libraries. Chatbot supports information retrieval from databases about movie times, sports scores, stock prices, news, and weather (Adamopoulou & Moussiades2020). ChatGPT is also a very useful tool to find accurate literature search results. It is useful in libraries as indicated by (Ali, Naeem, & Bhatti) in their research of 2020. Chatbot services are used for reference queries, library instruction and information retrieval. This finding is based on the answers to six interview questions from ChatGPT. Research questions are discussed below.

### **RQ 1 Is there a ChatGPT application in the information and library industries?**

Chatbot is very supportive of the library and library staff. As a conversational agent it can give quick and accurate responses to user queries. It is also helpful in the suggestion of library resources and in the collection development. It can recommend help in research and give instruction to library users. In short, both library users and librarians can take advice from ChatGPT regarding information seeking and searching. ChatGPT has improved the research and scholarship of academic institutions (Lund & Wang, 2023). ChatGPT also has a very supportive role in scientific writing and saves the time of the researchers (Nguyen, 2023; Tate, Doroudi, Ritchie, & Xu, 2023).

Like other AI tools chatbot has a strong implication in library and information services, as per the response received from AI. It supports better access to information, offers recommended reading for the users, and provides suggestions to library users. It supports the library team in highlighting library collections. Basically, ChatGPT is an attempt to provide all existing solutions under one umbrella. Coding has become easier, and everyone can do coding or use coding from different platforms.

ChatGPT has great impact on reference services as indicated by the fact that traditional chatbots have been replaced by chatGPT due to real time correct response (Chen, 2023). ChatGPT provides better answers compared to other chatbots. ChatGPT is a real example of the synchronous reference service. Regarding synchronous reference services or real time services (Ali & Haider, 2016), ChatGPT seems to be very fast to respond and this is a very good example of received synchronous references services. ChatGPT will be helpful in supporting digital references services in libraries as indicated by Adetayo in 2023 and Wan in 2022.

### **RQ 2 Which library and information services provided by ChatGPT are helpful?**

ChatGPT supports all aspects of the library and information services. It is a very good source for library users and the librarian. ChatGPT provides instant access to information, Multilingual support, and personal reading suggestions. It also describes the source of information (Panda & Kaur2023). Databases search and are helpful in the cataloguing of library material and in the collections development.

ChatGPT is also helpful in research support services. ChatGPT also helps in literature search and text generation, and in language translation of research papers/articles (Lund & Wang, 2023).

### **RQ 3 Can ChatGPT help with information retrieval for library users?**

ChatGPT is a good information retrieval source for library users. It provides a fast and accurate retrieval system which is better than that of any web search engine and its accuracy is more relevant to the search engine where thousands of web pages are retrieved, though not all of them are helpful.

### **RQ 4 As a conversational agent can ChatGPT support reference services?**

ChatGPT works as a conversational agent and can provide reference services to library users round the clock. ChatGPT responds in real time and provides ready reference services like instant questions, general query, library instruction, and literature search (Mali & Deshmukh, 2023).

In another study on the response rate of ChatGPT (Lai, 2023) it was highlighted that ChatGPT's overall performance in responding to reference questions is fair. Its performance is not good enough in complex queries and narrow questions.

### **RQ 5 Is ChatGPT a threat to the library industry?**

The ChatGPT response was that there is no threat to the library industry from ChatGPT. It is very helpful to both library users and librarians. It is an AI-based chat service. Chat GPT poses no threat to librarians. It works in real-time conversation. The librarian should train library patrons in AI literacy skills to their patrons. It creates jobs for the AI-literate personnel. Technology always supports the library and information industry. It is the responsibility of information professionals to learn new technology and apply this technology in their respective libraries.

### **RQ 6 How does ChatGPT affect librarian jobs?**

ChatGPT has a positive effect on librarian jobs. It will save the librarian time by responding to the queries made by users, and by offering reading suggestions and giving library instruction. It also guides the librarian on how to build their collection and resources as per the needs of the library. However, there are still plenty of tasks a librarian must do like content management, and resource management is also a key responsibility of a librarian. Besides the conversation with ChatGPT, library users still need guidance from the librarian about which suggestion by ChatGPT is the best option or recommendation. ChatGPT also supports the librarian resource management tasks like the selection of electronic books electronic journals and databases. It also supports library users for recommended reading as per the users' needs.

Libraries will continue to exist and serve library users. Technologies provide a helping hand and serve patrons. They cannot replace the librarian (Subaveerapandiyan, Vinoth & Tiwary, 2023). Like other AI tools, ChatGPT does not threaten librarians and library staff jobs. AI has a few challenges as indicated by ethical issues, biases, and privacy (Ali, Naeem, Bhatti, & Richardson, 2022). Similar challenges about ChatGPT were mentioned in a recent study by Lund & Wang in 2023. They found that bias, privacy, autonomy of information consent, and accountability and transparency are major challenges. ChatGPT challenges are also explored in terms of accuracy and reliability. The limited scope of the topic, accessibility, and personal queries are the areas that need to improve (Kirtania, 2023).

## **8. Conclusion**

Different types of chatbots have been launched and used in libraries for library services and user support since the invention of chatbots. AI-based ChatGPT is one of the most advanced and modern chatbots designed under the framework of NLP. ChatGPT has a good future with libraries and information centers.

In this study researchers explored the possible use and application of ChatGPT in libraries and information centers. As per the response to ChatGPT's six questions, ChatGPT will become an essential part of libraries due to its unique feature and it has a very user-friendly interface. It will help to manage the library resources and collection and as well as provide fast and quick access to relevant information. It also supports information retrieval and instruction. Chatbots are used in libraries and information centers to serve library users mostly by responding to user queries as a reference service. ChatGPT saves the responses of users so that they can recall what they asked ChatGPT in their previous online session. It can also analyze and interpret the library data. There is no threat to librarians or library jobs. It is the helping hand of the library to facilitate the information to users and information lovers.

This study provides another avenue of new research on the accuracy of the answers of ChatGPT to questions asked. It provides an evaluation of the answers of ChatGPT as suggested by Nguyen, 2023, by evaluating the performance of AI-based chatbot. ChatGPT is a new emerging technology and soon there will be a lot of debate, discussion and research conducted in higher education on libraries and library services.

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