

# Comparative Study on AI-Based ChatGPT and Library Systems in Higher Education for Information Collection

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**Abstract:** Artificial Intelligent (AI)-based GPTs are able to provide expert information in all industry sectors. Hence it is decided to examine the possibility of using ChatGPT to replace the conventional Library in higher education. In this chapter, an exploratory study on the comparison of information collection processes from AI-Based ChatGPT and Higher Education Libraries. This includes a description of the effect of technology on information collection and an analysis of the AI-based GPTs in terms of their capability to provide the right information at any time by evaluating the model of AI-based GPTs in terms of information generation and dissemination. This also includes a systematic comparison of the services provided by traditional libraries and digital libraries with AI-based GPT for students/readers, a study of the advantages, benefits, constraints, and disadvantages of ChatGPT in terms of providing Library services to readers by ABCD analysis framework and interpretation of the impact of AI-based GPTs on the information collection process of the Higher Education System. Based on analysis, comparison, and evaluation of ChatGPT with traditional and digital library systems, some suggestions are given on the use of AI-GTPs in Higher Education based on its advantages and benefits to the readers of tangible or intangible resources provided in libraries. It is found that

AI-based GPTs are expected to be complementary to traditional libraries in terms of providing customized information support.

**Keywords:** ChatGPT, Artificial Intelligence based GPTs, AI-based GPTs in Higher Education, ABCD listing analysis, ChatGPT for Library Services, ChatGPT for Information, Exploratory study

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## Introduction

Technology refers to the application of scientific knowledge for practical purposes. It includes a wide range of tools, techniques, and systems that are designed to solve problems, improve efficiency, and enhance human capabilities. Technology has been instrumental in transforming and improving various aspects of society. In the education industry, technology is used for making innovations in the way we learn & teach and made education more accessible to people of all ages and backgrounds. Online courses, virtual classrooms, and educational apps have made it easier for people to learn at their own pace, on their own time. It also improves the quality of service offered, making tasks easier, and expanding our capabilities. Technology has had a major impact on education, making learning more accessible and engaging <sup>[1-2]</sup>. Online courses, educational software, and digital textbooks have made it possible for people to learn from anywhere at any time. Some of the examples of how technology is being used in education include:

- (1) Online learning platforms like Coursera, Udemy, and Khan Academy provide access to high-quality educational materials and courses to anyone with an internet connection. Students can learn at their own pace, from anywhere in the world,
- (2) With virtual classrooms, students and teachers can connect in real-time from different locations. This technology makes it possible for students to attend classes from remote areas

and also provides access to specialized courses that may not be available in their local schools,

- (3) Educational apps like Duolingo, Quizlet, and Edmodo are designed to help students learn, and practice new concepts. These apps provide a fun and interactive way to learn, making education more engaging and effective,
- (4) The use of game-like elements in education, known as gamification, has been shown to increase student engagement and motivation. Gamification can be used in a variety of educational contexts, from language learning to science experiments,
- (5) Artificial Intelligence is increasingly being used in education to personalize learning, provide feedback, and assess student performance. AI-powered tools can help teachers identify areas where students may be struggling and provide targeted support.

Ubiquitous education technology, also known as ubiquitous learning (u-learning), supports the integration of technology into learning environments in a way that makes education available anytime and anywhere <sup>[3-5]</sup>. Some of the ubiquitous education technology features can improve information-based learning include:

- (1) **Personalized learning:** Ubiquitous education technology can be used to personalize the learning experience, tailoring the content and pace of instruction to the needs of individual learners. This can help to improve the effectiveness of the learning process, as learners are more likely to engage with material that is relevant and interesting to them.
- (2) **Collaborative learning:** Ubiquitous education technology can also facilitate collaborative learning, allowing learners to work together in real-time, regardless of their location. This can help to improve social interaction and communication

skills, while also fostering a sense of community and shared learning.

- (3) **Mobile learning:** Ubiquitous education technology makes it possible for learners to access educational materials on-the-go, using mobile devices like smartphones and tablets. This can help to improve accessibility and convenience, allowing learners to study and learn at their own pace, wherever and whenever it is most convenient for them.
- (4) **Interactive learning:** Ubiquitous education technology can also facilitate interactive learning experiences, using tools like virtual reality and augmented reality to create immersive educational environments that engage learners and promote deeper learning.
- (5) **Access to a wide range of resources:** Ubiquitous education technology makes it possible for users to access a wide range of resources, including multimedia content, online databases, and collaborative learning tools. This makes it easier for users to find the information they need and to collaborate with others to enhance their learning experience.
- (5) **Real-time feedback:** Ubiquitous education technology can provide real-time feedback to users, allowing them to monitor their progress and identify areas where they need to focus their attention. This feedback can help users stay motivated and engaged in the learning process.
- (6) **Blended learning:** Ubiquitous education technology can also enable blended learning, where users can learn through a combination of online and in-person instruction. This can provide a more flexible and personalized learning experience, allowing users to get the best of both worlds.

Apart from the above, advents in technology support the development of Universal Digital Libraries (UDL) which have the capabilities to provide learning resources in the form of ubiquitous information <sup>[6-7]</sup>. Further, the importance of such UDL

is getting diluted due to the development of Artificial Intelligence and other technology-supported GPTs. This is due to the fact that AI-based GPTs have abilities to provide global information in any language as expert advice.

## **Objective of the Chapter**

In this paper, we made an exploratory study on the comparison of information retrieval processes from AI-Based ChatGPT and Higher Education Libraries. The objectives of the study include:

- (1) To discuss the effect of technology on information collection.
- (2) To analyze the AI-based GPTs in terms of their capability to provide the right information at any time
- (3) To evaluate the model of AI-based GPTs in terms of information generation and dissemination
- (4) To compare the services provided by traditional libraries and digital libraries with AI-based GPT for students/readers.
- (5) To study the advantages, benefits, constraints, and disadvantages of ChatGPT in terms of providing Library services to readers compared to traditional libraries.
- (6) To interpret the impact of AI-based GPTs on the information collection process of the Higher Education System.
- (7) To suggest the use of AI-GTPs in Higher Education based on its advantages and benefits to the readers.

## **Various GPTs and Their capabilities :**

There are several GPTs (Generative Pre-trained Transformer models) currently available with varying capabilities in terms of providing the right information at the right time <sup>[8]</sup>. Few examples include:

- (1) **GPT-3:** Developed by OpenAI, GPT-3 is currently one of the most advanced GPT models available. It can generate

human-like responses to a wide range of prompts, including text completion, translation, and summarization.

- (2) **GPT-2:** Also developed by OpenAI, GPT-2 is capable of generating coherent and grammatically correct responses to a wide range of prompts, including text completion, translation, and summarization.
- (3) **GPT-1:** This was the first GPT released by OpenAI and has 117 million parameters. It is less powerful than GPT-2 and GPT-3, but still has the capability to generate coherent text and answer questions.
- (4) **T5:** Developed by Google, T5 is a GPT model that is capable of performing a wide range of natural language processing tasks, including translation, text summarization, and question answering.
- (5) **BERT:** Developed by Google, BERT (Bidirectional Encoder Representations from Transformers) is a GPT model that is particularly adept at understanding the context of words in a sentence, making it well-suited for tasks like sentiment analysis and natural language understanding.
- (6) **XLNet:** Developed by Carnegie Mellon University and Google, XLNet is a GPT model that is particularly adept at dealing with long sequences of text, making it well-suited for tasks like document classification and text summarization.
- (7) **CTRL:** This GPT was developed by Salesforce and has been used for tasks such as text completion and generation.
- (8) **RoBERTa:** This GPT was developed by Facebook AI Research and has been used for tasks such as language modeling and text classification.

Each of these GPT models has its own strengths and limitations, and the suitability of a particular model will depend on the specific task or application. It's important to carefully consider the capabilities of each model when selecting the

appropriate GPT for a particular task. In terms of providing the right information at the right time, the effectiveness of each GPT will depend on several factors, including the quality of the training data, the specificity of the query, and the context in which the information is being sought. GPT-3 is currently one of the most powerful GPTs available, with the ability to generate high-quality text on a wide range of topics. However, the most suitable GPT for a specific task will depend on the specific requirements and context of the task.

### *How AI-Based GPT collects information ?*

AI-based GPT (Generative Pre-trained Transformer) is a language model that uses a combination of machine learning and natural language processing (NLP) techniques to collect and analyze information<sup>[9]</sup>. AI-based GPTs collect information by using a large corpus of text data as input during their pre-training phase. This corpus of data can come from a variety of sources, such as books, articles, websites, and other text-based sources.

Here's how it works:

- (1) **Pre-training:** GPT is pre-trained on a large corpus of text data, such as books, articles, and web pages. During pre-training, the model uses unsupervised learning techniques to identify patterns and relationships in the data.
- (2) **Fine-tuning:** After pre-training, GPT can be fine-tuned on specific tasks or domains, such as text classification or language translation. Fine-tuning involves training the model on a smaller dataset of labeled examples that are specific to the task at hand.
- (3) **Input processing:** When given a new input, such as a sentence or paragraph of text, GPT uses its pre-trained and fine-tuned models to analyze and interpret the input. This involves breaking the input down into smaller units, such as

words or phrases, and analyzing the relationships between them.

- (4) **Contextual analysis:** GPT uses a technique called “*contextual analysis*” to understand the meaning of the input in context. This involves considering not only the individual words in the input, but also the relationships between them and the broader context in which they appear.
- (5) **Output generation:** Based on its analysis of the input, GPT can generate a variety of outputs, such as text responses, summaries, or translations. The outputs are generated based on the model’s understanding of the input and the patterns it has learned from the pre-training and fine-tuning steps.

Hence, GPT is a powerful tool for collecting and analyzing information in natural language. By leveraging the latest advances in AI and NLP, GPT can process and analyze large volumes of text data quickly and accurately, making it a valuable tool for a wide range of applications.

### ***How AI-Based GPT make decisions?***

AI-based GPT (Generative Pre-trained Transformer) models, such as GPT-3, do not make decisions in the traditional sense. Instead, they generate responses based on the patterns and relationships they have learned from large datasets of text data during pre-training and fine-tuning <sup>[10]</sup>.

When GPT models are used to generate text, they use a technique called “*autoregression*” to generate a sequence of words that are most likely to follow the input prompt or context. The model generates each word one at a time, based on the probability of each possible word given the words that have already been generated. When given a prompt or a question, the GPT model uses its understanding of language and context to generate a response that is relevant and coherent. The model generates this



response based on the patterns and relationships it has learned during pre-training and fine-tuning for specific tasks.

While GPT models do not make decisions in the same way that humans do, they can be used to support decision-making by generating responses or predictions that are based on their understanding of language and context <sup>[11]</sup>. However, GPT models do not have the ability to make decisions or judgments on their own. They are limited to generating responses based on the input they receive, and they do not have the ability to take action or make decisions based on their responses. For example, a GPT model could be used to generate a summary of a lengthy document or to provide insights based on a dataset of customer feedback.

It's important to note that while GPT models can generate responses that are relevant and coherent, they are not always accurate or unbiased. As with any machine learning model, it's important to carefully evaluate the outputs and consider the limitations of the model when using it to support decision-making. Therefore, while AI-based GPT models can be very useful for generating insights and information, they are not a replacement for human decision-making. Instead, they can be used to augment human decision-making by providing additional information and insights that can help inform decisions.

## **Traditional Library Systems in Higher Education**

Traditional libraries play an essential role in higher education by providing students, faculty, and researchers with access to a vast collection of scholarly resources. These libraries are typically housed within academic institutions and are staffed by trained professionals who help users navigate the library's resources. In addition to physical books and journals, traditional libraries offer access to electronic resources such as online databases, e-books, and e-journals. These resources are often essential for

research in various fields of study and are frequently updated to ensure the most current information is available.

Traditional libraries also offer a variety of services to support students and faculty in their academic pursuits, such as reference services, interlibrary loan, and instruction in information literacy skills. These services are particularly valuable for students who are just beginning their academic journey and need assistance navigating the vast array of resources available to them. Hence, traditional libraries remain an essential component of higher education, providing students, faculty, and researchers with access to a wealth of resources and support services that are vital for academic success.

### ***Importance of Library in Higher Education***

Library play a crucial role in higher education <sup>[13-14]</sup>. This is due to following reasons:

- (1) Access to resources:** Library systems provide students, faculty, and staff with access to a wide range of resources, including books, journals, magazines, and online databases. These resources are essential for conducting research and completing coursework.
- (2) Support for learning and research:** Library systems provide support for learning and research through a variety of services, including reference and research assistance, interlibrary loan, and document delivery.
- (3) Collaboration and community:** Library systems provide a space for collaboration and community building. Many libraries offer study spaces, group meeting rooms, and other resources that encourage collaboration and social interaction among students, faculty, and staff.
- (4) Preservation of knowledge:** Library systems are responsible for preserving and maintaining knowledge for future generations. They collect, organize, and store information

in a variety of formats, ensuring that it is accessible to future scholars and researchers.

- (5) **Information literacy:** Library systems promote information literacy, teaching students how to locate, evaluate, and use information effectively. These skills are essential for success in higher education and in the workforce.
- (6) **Integration with technology:** Library systems are increasingly integrating technology into their services and resources, such as providing access to online databases and e-books. This enables students and faculty to access information from anywhere and at any time.

Thus, library systems are an essential component of higher education. They provide access to resources, support for learning and research, a space for collaboration and community, preservation of knowledge, and promote information literacy.

#### *Importance of Library in Research:*

Library systems play a critical role in research by providing access to a vast array of resources, support, and services that are essential for conducting research effectively <sup>[15]</sup>. Here are some of the ways in which library systems are important for research:

- (1) **Access to information:** Library systems provide access to a broad range of resources, including books, journals, online databases, and other specialized collections. These resources provide researchers with the knowledge and information they need to conduct their research.
- (2) **Research assistance:** Library systems offer research assistance services to help researchers identify relevant resources and access them effectively. This may include help with literature searches, citation management, and database searching.
- (3) **Preservation of knowledge:** Library systems are responsible for preserving and maintaining the scholarly record,

including books, journals, and other materials. They ensure that this knowledge is available to researchers now and in the future.

- (4) **Interlibrary loan:** Library systems can facilitate interlibrary loan services, allowing researchers to borrow materials from other institutions if they are not available locally. This can be essential for accessing hard-to-find or specialized resources.
- (5) **Open access:** Library systems may also support open access initiatives, which make scholarly articles, data, and other materials freely available online. This increases the visibility and impact of research and promotes knowledge sharing.

Thus, library systems are critical for research as they provide access to resources, research assistance, preservation of knowledge, interlibrary loan services, and support for open access initiatives. They play a crucial role in enabling researchers to access the information they need, collaborate effectively, and produce high-quality research.

### **ChatGPT for Information Collection :**

ChatGPT can be a powerful tool for information collection, as it has the ability to gather and process vast amounts of data from a wide range of sources <sup>[16-25]</sup>. Here are some ways that ChatGPT can be used for information collection:

- (1) **Web Scraping:** ChatGPT can be used to collect information from websites and other online sources, such as social media platforms and news sites. This information can be used to gain insights into user behavior, sentiment analysis, and market trends.
- (2) **Natural Language Processing:** ChatGPT's natural language processing capabilities allow it to analyze and interpret unstructured data, such as text documents and audio recordings. This can be useful for gathering information

from customer feedback, surveys, and other sources of qualitative data.

- (3) **Data Integration:** ChatGPT can integrate data from multiple sources, such as databases, APIs, and external systems. This can help to create a more complete picture of the data and provide deeper insights into trends and patterns.
- (4) **Chatbot Surveys:** ChatGPT can be used to create chatbot surveys, which can be deployed to collect information from users in a more interactive and engaging way. This can be particularly useful for gathering feedback on products, services, and customer experiences.

Hence, ChatGPT can be a powerful tool for information collection, providing businesses and organizations with valuable insights into their customers, products, and markets. However, it is important to ensure that data collection is done ethically and with user privacy in mind.

ChatGPT can be a useful tool for information collection, especially when dealing with large volumes of data or complex topics. Here are a few ways ChatGPT can be used for information collection:

- (1) **Data Mining:** ChatGPT can be used to mine large datasets for specific information, such as keywords or trends. This can be especially useful in fields like marketing or finance, where there is a need to analyze large volumes of data to make informed decisions.
- (2) **Literature Review:** ChatGPT can be used to assist in literature reviews, helping researchers to quickly identify and collect relevant articles and studies on a particular topic. This can save time and effort, allowing researchers to focus on analyzing and synthesizing the information they collect.
- (3) **Customer Feedback:** ChatGPT can be used to collect and analyze customer feedback, providing businesses with

valuable insights into customer preferences, pain points, and behaviors. This can be used to inform product development, marketing strategies, and customer support initiatives.

- (4) **Social Media Monitoring:** ChatGPT can be used to monitor social media channels for mentions of a brand or product, providing businesses with real-time feedback on how their products and services are being received. This can be used to make adjustments to marketing and product strategies, and to address customer concerns in a timely manner.

Thus, ChatGPT can be a powerful tool for information collection, providing businesses and researchers with a way to quickly and efficiently collect and analyze large volumes of data. As the technology continues to evolve, we can expect to see new and innovative applications emerge, further enhancing the capabilities of ChatGPT for information collection.

In academics, ChatGPT can also be a useful tool for academic information collection, particularly for literature reviews and research. Here are some ways ChatGPT can be used in academic information collection:

- (1) **Literature Reviews:** ChatGPT can assist researchers in conducting literature reviews, helping to identify and collect relevant articles and studies on a particular topic. Researchers can input keywords or phrases related to their research question, and ChatGPT can generate a list of relevant sources.
- (2) **Citation Searches:** ChatGPT can help researchers to find additional sources related to a particular citation or author. By inputting the citation information or author name, ChatGPT can generate a list of related sources, allowing researchers to quickly and easily expand their research.
- (3) **Reference Checking:** ChatGPT can be used to check the accuracy and completeness of references in academic papers. Researchers can input the citation information, and ChatGPT

can provide information about the source, including author, publication date, and other relevant details.

- (4) Information Retrieval:** ChatGPT can be used to retrieve information on a wide range of academic topics, including research methods, theories, and case studies. Researchers can input questions related to their research, and ChatGPT can provide relevant information and resources.

Thus, ChatGPT can be a valuable tool for academic information collection, helping researchers to quickly and efficiently collect and analyze relevant information. As the technology continues to evolve, we can expect to see new and innovative applications emerge, further enhancing the capabilities of ChatGPT for academic research.

### ChatGPT as Quasi Virtual Library

ChatGPT can be used as a quasi-virtual library by providing users with access to a vast array of information and resources [26]. Here are some ways ChatGPT can be used as a quasi-virtual library:

- (1) Accessibility:** ChatGPT can be accessed from anywhere with an internet connection, making it a highly accessible source of information. This can be particularly useful for individuals who may not have access to a physical library or who need to access information quickly.
- (2) Large Volume of Information:** ChatGPT has access to vast amounts of information, including articles, books, and other sources of information. This allows users to quickly find information on a wide range of topics, without needing to physically search through a large number of books or articles.
- (3) Personalized Recommendations:** ChatGPT can provide personalized recommendations based on a user's interests and past search history. This can help users to discover new

sources of information that may be relevant to their research or interests.

- (4) **Instant Responses:** ChatGPT can provide instant responses to user queries, allowing individuals to quickly find the information they need. This can be especially useful for time-sensitive research projects or for individuals who need information quickly.
- (5) **Information Retrieval:** ChatGPT can provide users with access to a wide range of information, including books, articles, and other resources. Users can input their queries and ChatGPT can generate a list of relevant sources.
- (6) **Reference Checking:** ChatGPT can be used to check the accuracy and completeness of references in academic papers, providing users with information about the source, including author, publication date, and other relevant details.
- (7) **Research Assistance:** ChatGPT can assist users in conducting research by providing access to a wide range of resources and assisting with literature reviews, citation searches, and other research-related tasks.

Hence, ChatGPT can be a powerful tool for information access and discovery, providing users with a quasi-virtual library experience. As the technology continues to evolve, we can expect to see new and innovative applications emerge, further enhancing the capabilities of ChatGPT as a quasi-virtual library.

### **ChatGPT as Universal Library :**

ChatGPT has the potential to serve as a universal library, providing users with access to a vast array of information and resources from various fields and domains. It can be used for:

- (1) **Multilingual Support:** ChatGPT can provide access to information in multiple languages, making it easier for users to find information in their preferred language.



- (2) **Cross-Disciplinary Access:** ChatGPT can provide access to information from various fields and domains, allowing users to explore and learn about new topics and subjects.
- (3) **Accessibility:** ChatGPT can be accessed from anywhere with an internet connection, making it more accessible to users who may not have access to traditional libraries or resources.
- (4) **Personalization:** ChatGPT can provide personalized recommendations based on a user's preferences and interests, helping users to discover new resources and information.
- (5) **Access to Diverse Information:** ChatGPT can provide users with access to information from a variety of sources and disciplines, including academic research, news articles, and multimedia content.
- (6) **Customizable Preferences:** ChatGPT can be customized to reflect a user's interests and preferences, providing personalized recommendations and information.
- (7) **Continuous Learning:** ChatGPT is constantly learning and improving its capabilities, meaning that its knowledge base is constantly expanding. This makes it a valuable resource for users who need access to the latest information and research.

Thus, ChatGPT has the potential to serve as a universal library, providing users with access to a vast array of information and resources from various fields and domains. As the technology continues to evolve, we can expect to see new and innovative applications emerge, further enhancing the capabilities of ChatGPT as a universal library.

While university libraries are an important resource for students and researchers, there are some limitations to their use when compared to ChatGPT. Such limitations of university libraries include:

- (1) **Limited Access:** University libraries can be limited in terms of the number of resources they offer and their availability. This can be particularly problematic for students and researchers who require access to a wide range of resources, particularly those that are not available locally.
- (2) **Limited Resources:** Digital libraries may be limited in terms of the number of resources they offer, particularly if they are curated by a single institution or organization. This can be particularly problematic for students and researchers who require access to a wide range of resources.
- (3) **Time and Location Constraints:** University libraries are typically only open during certain hours and may be limited in terms of their physical locations. This can make it difficult for students and researchers to access the resources they need, particularly if they are studying remotely or have limited time available.
- (4) **Language Barriers:** University libraries may not have resources available in all languages, making it difficult for non-native speakers to access information and research from around the world.
- (5) **Human Bias:** University libraries are typically curated by human librarians, who may have their own biases and preferences when it comes to selecting resources. This can result in a limited range of resources being available, particularly if the librarian is not familiar with a particular subject area or topic.

Hence, ChatGPT can provide users with access to a vast array of information and resources from across the globe, with no time or location constraints. ChatGPT also has the ability to understand and respond in multiple languages, making it a valuable resource for users who speak different languages. Additionally, ChatGPT is not subject to human bias and can provide users with a broader range of resources and recommendations. However, it's important

to note that ChatGPT is not a replacement for university libraries, but rather a complementary tool that can enhance the research experience for students and researchers.

## Effect of AI-Based GPTs on THE Library System

The advent of AI-Based GPTs (Generative Pre-trained Transformers) is having a significant impact on the Higher Education (HE) Library System. Some of the effects of AI-Based GPTs on HE Library System are listed below:

- (1) **Increased Efficiency:** AI-Based GPTs can automate many library tasks, such as cataloging, sorting, and searching, which can save time and increase efficiency for librarians and users. This allows librarians to focus on more complex tasks and improve the overall library experience for users.
- (2) **Improved Access to Information:** GPTs can provide users with instant access to a vast array of information and resources from across the globe. This can greatly enhance the research experience for students and researchers, as they can quickly find the information they need without having to physically search through stacks of books or browse through digital libraries.
- (3) **Personalized Recommendations:** GPTs can analyze a user's search history and provide personalized recommendations based on their interests and needs. This can help users discover new resources and information that they may not have otherwise found on their own.
- (4) **Increased Collaboration:** GPTs can facilitate collaboration among researchers and students by providing a platform for sharing information and resources. This can help to break down silos and promote interdisciplinary research and learning.
- (5) **Enhanced Accessibility:** AI-Based GPTs can provide more personalized recommendations and search results based on

the user's preferences and history, making it easier for users to find relevant information quickly. Additionally, AI-Based GPTs can be programmed to understand and respond in multiple languages, making information more accessible to non-native speakers.

- (6) **Improved User Experience:** AI-Based GPTs can provide users with a more interactive and engaging experience, with the ability to ask questions and receive personalized recommendations in real-time. This can enhance the overall library experience for users and encourage them to use the library more frequently.
- (7) **Greater Data Insights:** AI-Based GPTs can analyze user data and provide librarians with insights into user behavior and preferences, which can help librarians make better decisions about library resources and services.
- (8) **Challenges to Privacy and Security:** The use of AI-Based GPTs can raise privacy and security concerns, particularly if user data is being collected and analyzed. Libraries will need to ensure that they have appropriate safeguards in place to protect user privacy and secure user data.
- (9) **Challenges to Traditional Library Systems:** While GPTs can enhance the research experience for users, they may also pose challenges to traditional library systems. As GPTs become more sophisticated and user-friendly, they may be seen as a more convenient alternative to traditional library systems.

Hence, AI-Based GPTs have the potential to significantly improve the HE Library System, by enhancing efficiency, accessibility, user experience, and data insights. However, librarians and library systems will need to carefully consider the potential risks and challenges associated with the use of AI-Based GPTs, and implement appropriate measures to mitigate them.

## Comparison of ChatGPT with Physical Library

There are several ways in which ChatGPT, as an AI language model, can be compared to a physical library. Here are some key differences and similarities:

- (1) **Access to information:** One of the main benefits of a physical library is that it provides access to a wide range of books, journals, and other resources. Similarly, ChatGPT has access to a vast amount of information and can provide answers to a wide range of questions.
- (2) **Availability:** ChatGPT is an online resource that is available 24/7, while physical libraries have set hours of operation and may not be accessible outside of those hours.
- (3) **Scope of information:** ChatGPT has access to vast amounts of information from a variety of sources, while physical libraries are limited by the physical books and materials they have in their collection.
- (4) **Expertise:** ChatGPT is a machine learning model trained to understand and respond to natural language, while physical libraries may have subject-matter experts available to provide guidance and advice.
- (5) **Speed:** ChatGPT is capable of processing and providing responses to questions much faster than a physical library. While it may take some time to locate a specific book or article in a physical library, ChatGPT can provide an answer almost instantly.
- (6) **Accuracy:** Physical libraries are generally considered to be highly accurate sources of information, as they are often curated by trained professionals. Similarly, ChatGPT has been trained on large amounts of high-quality data and is capable of providing accurate answers to many questions.
- (7) **Bias:** One potential drawback of physical libraries is that they may be subject to bias, as the selection of books and

resources may be influenced by the opinions and perspectives of the librarians. Similarly, ChatGPT may be subject to bias depending on the data it was trained on.

- (8) **Interaction:** Physical libraries provide an opportunity for interaction with librarians and other patrons, which can be helpful in finding information and developing research skills. Similarly, ChatGPT provides an interactive experience where users can ask questions and receive answers in real-time.
- (9) **Limitations:** While ChatGPT can provide answers to a wide range of questions, it is not a replacement for the depth and breadth of information available in a physical library. Additionally, physical libraries may provide access to physical resources such as rare books and manuscripts that cannot be accessed through ChatGPT.

Thus, while both ChatGPT and physical libraries serve important roles in providing access to information, they have different strengths and weaknesses. ChatGPT is particularly useful for providing quick and targeted responses to specific questions, while physical libraries can provide more comprehensive information and may have subject-matter experts available for guidance.

### Comparison of ChatGPT with Digital Library

ChatGPT and digital libraries are both online resources that provide access to information, but they differ in some key ways. Some comparisons between ChatGPT and digital libraries:

- (1) **Type of content:** ChatGPT is an AI language model that can answer specific questions and provide information on a wide range of topics. Digital libraries, on the other hand, typically offer a more extensive collection of e-books, journals, and other digital resources.

- (2) **Searchability:** ChatGPT relies on natural language processing to understand and respond to user queries, while digital libraries typically rely on keyword searches to locate relevant content.
- (3) **Interactivity:** ChatGPT is interactive, allowing users to ask specific questions and receive targeted responses. Digital libraries, while also providing access to information, may not offer the same level of interactivity and may require users to navigate through different resources on their own.
- (4) **Scope of Information:** ChatGPT has access to vast amounts of information from a variety of sources, while digital libraries are typically limited to digital versions of physical books and materials.
- (5) **Speed:** ChatGPT can provide answers to questions quickly, often within seconds or minutes, while digital libraries may require more time to locate and retrieve information.
- (6) **Access:** ChatGPT is often freely available online, while digital libraries may require a subscription or membership to access certain resources.
- (7) **Expertise:** ChatGPT is an AI language model trained to provide responses based on the patterns and relationships learned during pre-training and fine-tuning. Digital libraries may provide access to subject-matter experts or other resources that offer more specialized and comprehensive information.

Thus, ChatGPT is particularly useful for providing quick and targeted responses to specific questions, while digital libraries can provide more comprehensive information and may have subject-matter experts available for guidance. Both resources can be valuable for accessing information, and the choice of which to use may depend on the specific needs of the user.

## **ABCD Analysis of ChatGPT based Information system compared to Physical Libraries in HE Institutions :**

ABCD analysis (Advantages, Benefits, Constraints, and Disadvantages) is a framework proposed in the year 2016 to analyze systems, concepts, ideas, strategies, products/services, materials, etc. <sup>[29-33]</sup>. ABCD analysis framework can be used both qualitatively and quantitatively depending upon requirements<sup>[34]</sup>. Qualitative ABCD analysis framework consists of (1) ABCD listing from information gathering from primary and secondary sources <sup>[35-40]</sup>, (2) ABCD listing from Stakeholders' point of view <sup>[41-44]</sup>, (3) Factor and Elemental analysis using ABCD framework <sup>[45-50]</sup>. The quantitative ABCD analysis framework consists of (1) Ranking the ABCD constructs based on primary data <sup>[51-58]</sup>, and (2) Statistical analysis of ABCD constructs]. In this section, we have used ABCD listing of using GPT-based Higher Education Information Collection compared to traditional libraries.

### ***Advantages of ChatGPT compared to traditional libraries:***

ChatGPT, as a language model, offers several advantages compared to traditional libraries for various tasks. Here are some of the key advantages:

- (1) Versatility:** ChatGPT is a general-purpose language model that can handle a wide range of tasks, including text generation, language translation, summarization, question answering, and more. Traditional libraries, on the other hand, often specialize in specific domains or tasks.
- (2) Fewer dependencies:** When using traditional libraries, you typically need to install and manage multiple dependencies for different tasks. With ChatGPT, you only need access to the API or the model itself, reducing the need for additional installations and updates.
- (3) Continuous learning and improvement:** ChatGPT is trained on vast amounts of data and benefits from ongoing



updates and improvements. It has a knowledge cutoff date but can still provide relevant and up-to-date information based on its pre-training. Traditional libraries may not have the same level of continuous learning and improvement.

- (4) **Natural language understanding:** ChatGPT excels at understanding and generating human-like text. It can understand complex queries, nuanced language, and contextual information, making it suitable for conversational applications. Traditional libraries may require additional preprocessing or rule-based approaches to achieve similar results.
- (5) **Pre-trained knowledge:** ChatGPT has been trained on a diverse range of internet text, giving it a broad knowledge base to draw upon. It can provide information on various topics without requiring explicit training on specific datasets. Traditional libraries often require domain-specific training data to perform well in specific tasks.
- (6) **Ease of integration:** ChatGPT can be easily integrated into existing applications or services using its API. This allows developers to leverage its capabilities without the need for extensive custom development or infrastructure setup. Traditional libraries may require more effort and time for integration.
- (7) **Scalability:** ChatGPT can handle large volumes of requests simultaneously, making it suitable for applications with high traffic or concurrent user interactions. Traditional libraries may have limitations in terms of scalability and response times.
- (8) **User experience:** ChatGPT can provide more engaging and interactive user experiences compared to traditional libraries. It can simulate conversation and respond in a conversational manner, creating a more dynamic and interactive environment.

While ChatGPT has these advantages, it's worth noting that traditional libraries still have their merits, particularly in domains where specialized models or algorithms are required or when specific constraints or requirements are in place.

*Benefits of ChatGPT compared to traditional libraries:*

Some benefits of using ChatGPT compared to traditional libraries:

- (1) **Ease of use:** ChatGPT provides a simple and straightforward interface for developers to interact with. It abstracts away the complexity of implementing and managing intricate algorithms or models, making it accessible to a wider range of developers, including those without deep expertise in natural language processing.
- (2) **Rapid prototyping:** ChatGPT allows for quick prototyping and experimentation. Developers can test ideas and build functional chatbot or conversational applications without spending significant time on algorithm design, feature engineering, or model training.
- (3) **Reduced development time:** With ChatGPT, you can significantly reduce the development time for language-related tasks. Instead of starting from scratch or adapting existing libraries, you can leverage ChatGPT's capabilities out of the box, saving time and effort.
- (4) **Flexibility:** ChatGPT is highly flexible and adaptable to various use cases. It can handle a wide range of natural language processing tasks, such as text completion, language translation, summarization, and more. This versatility eliminates the need to integrate and manage multiple libraries for different purposes.
- (5) **Continuous improvement:** As an AI language model, ChatGPT benefits from continuous improvement and updates from OpenAI. This ensures that the model remains

up-to-date with the latest advancements in natural language understanding and generation techniques, without requiring extensive manual updates or modifications.

- (6) **Reduced maintenance:** Traditional libraries often require regular maintenance, updates, and bug fixes. With ChatGPT, the burden of maintenance is shifted to the provider, allowing developers to focus more on application logic and user experience, rather than dealing with low-level library maintenance tasks.
- (7) **Access to vast knowledge:** ChatGPT has access to a wide range of knowledge and information through its training on a large corpus of text. It can provide insightful and contextually relevant responses, backed by its extensive pre-training, without relying on specific datasets or domain-specific knowledge bases.
- (8) **Scalability and infrastructure:** ChatGPT's API-based approach allows for easy scalability and avoids the need for developers to manage complex infrastructure requirements. OpenAI handles the backend infrastructure, ensuring reliable and scalable performance, even under high traffic or concurrent user interactions.
- (9) **User engagement:** ChatGPT's ability to generate human-like responses and engage in natural language conversations enhances user experience and interaction. It can create more immersive and personalized experiences, leading to increased user satisfaction and engagement.

It's important to note that while ChatGPT offers these benefits, traditional libraries still have their advantages in specific scenarios, particularly when fine-grained control, domain-specific knowledge, or specialized algorithms are required.

***Constraints of ChatGPT compared to traditional libraries:***

Some of the constraints of ChatGPT compared to traditional libraries are listed below:

- (1) **Customization limitations:** ChatGPT is a pre-trained language model with a fixed architecture and training objective. It may not be as easily customizable as traditional libraries, which allow for more fine-grained control over algorithms, models, and hyperparameters. Modifying the underlying architecture or training process of ChatGPT is not feasible without significant resources and expertise.
- (2) **Lack of domain-specific knowledge:** While ChatGPT has access to a vast amount of general knowledge, it may lack deep domain-specific knowledge. Traditional libraries can be specifically trained on domain-specific datasets or incorporate domain-specific rules, enabling them to provide more accurate and specialized results within a particular domain.
- (3) **Limited control over training data:** ChatGPT's training data comes from a diverse range of internet sources, which can include biased or unreliable information. Although OpenAI takes measures to mitigate bias, it's difficult to have complete control over the training data. Traditional libraries allow for more curated and controlled training datasets, which can be advantageous in certain applications with specific data requirements.
- (4) **Cost considerations:** While ChatGPT's API provides convenient access to its capabilities, it is not free of charge. Depending on usage, there may be associated costs for using ChatGPT in production. Traditional libraries, on the other hand, can be open source or have more flexible licensing options, potentially reducing costs, especially for smaller projects or non-commercial use.

- (5) **Dependency on internet connectivity:** ChatGPT's API requires an internet connection to function. This can be a limitation in scenarios with limited or unreliable internet access. Traditional libraries, once installed, can work offline and may be better suited for applications where online connectivity is a concern.
- (6) **Latency and response time:** ChatGPT's API may introduce additional latency due to the network communication involved. While OpenAI strives to provide efficient and responsive APIs, traditional libraries can offer faster response times for certain tasks, as they operate locally without the overhead of network requests.
- (7) **Limited control during inference:** Traditional libraries often allow developers to have fine-grained control over the inference process, enabling optimization and customization for specific hardware or performance requirements. In contrast, ChatGPT's API abstracts away many low-level details, limiting control over the inference process.
- (8) **Compliance and regulatory considerations:** Depending on the application and industry, there may be specific compliance or regulatory requirements that govern the use of AI models. Traditional libraries may offer more flexibility and control over data handling, privacy, and compliance aspects, allowing for easier adherence to specific regulations.

It's important to carefully consider these constraints and assess whether ChatGPT or traditional libraries are more suitable for the specific use case at hand. In some cases, a combination of both approaches may provide the best results.

#### *Disadvantages of ChatGPT compared to traditional libraries:*

While ChatGPT offers numerous advantages, it also has some disadvantages when compared to traditional libraries. Here are a few notable ones:

- (1) **Lack of transparency:** ChatGPT is a black-box model, meaning its inner workings are not easily interpretable or explainable. Traditional libraries often provide more transparency, allowing developers to understand and interpret the underlying algorithms, models, and decisions made during the processing of data.
- (2) **Limited control over output:** ChatGPT's generation process can sometimes produce outputs that are incorrect, nonsensical, or biased. It may generate responses that seem plausible but are not factually accurate. Traditional libraries, with their explicit algorithms and rules, offer more control over the output, allowing for precise customization and fine-tuning.
- (3) **Difficulty in handling complex logic:** While ChatGPT can understand and generate human-like text, it may struggle with complex logic or multi-step reasoning. Traditional libraries, with their explicit programming constructs and control flow, provide more flexibility in implementing complex decision-making processes.
- (4) **Dependency on external services:** ChatGPT relies on an external API to function, which means it requires an internet connection and is subject to the availability and reliability of the API. Traditional libraries, once installed, can operate independently, making them more suitable for offline or resource-constrained environments.
- (5) **Data privacy concerns:** When using ChatGPT's API, the text data sent to and received from the API may be processed and stored by OpenAI. This can raise data privacy and security concerns, especially for sensitive or confidential information. Traditional libraries can offer more control over data handling and storage, allowing for stricter data privacy measures.

- (6) **Risk of bias and unintended behavior:** ChatGPT, like other language models, can sometimes exhibit biased behavior or generate inappropriate content. While efforts are made to reduce bias during training, the model's responses may still be influenced by the biases present in the training data. Traditional libraries, with manual rule-based approaches, offer more direct control over bias mitigation.
- (7) **Limited offline availability:** ChatGPT's API requires an internet connection to function, making it unsuitable for scenarios where offline availability is crucial. Traditional libraries can be deployed locally or within closed systems, allowing for offline usage and reducing reliance on external services.
- (8) **Costs and pricing model:** While ChatGPT's API provides convenient access to its capabilities, it is associated with costs based on usage. The pricing model can make it less suitable for certain budget constraints or cost-sensitive projects. Traditional libraries, especially open-source ones, can offer more cost-effective alternatives.

It's important to carefully evaluate these disadvantages in the context of your specific requirements and constraints to determine the most appropriate approach for your project. In some cases, a hybrid approach that combines the strengths of ChatGPT and traditional libraries may be beneficial.

### **Impact of AI-based GPTs on the information collection process of the Higher Education System:**

The impact of AI-based GPTs on the information collection process of the higher education system is significant and multifaceted. Table 1 lists some of the key points to consider:

**Table 1:** *Impact of AI-based GPTs on the information collection process of the higher education system*

S.No.	Key Points	Explanation
1	Enhanced Efficiency	AI-based GPTs enable faster and automated information collection. They can swiftly process and analyze vast amounts of data, reducing the time and effort required for manual research. This efficiency allows higher education institutions to access and disseminate information more effectively.
2	Expanded Accessibility	GPTs can make academic information more accessible to a wider audience. With AI-powered chatbots or virtual assistants, students and researchers can obtain immediate answers to their queries, regardless of their location or time zone. This accessibility promotes inclusivity and supports a more flexible learning environment.
3	Time and Resource Optimization	GPTs can free up valuable time for librarians, educators, and researchers. By automating routine information collection tasks, AI-powered systems enable professionals to focus on more complex and specialized areas of their work. This optimization of resources enhances productivity and enables greater attention to value-added activities.
4	Improved Search and Discovery	AI-based GPTs can enhance the search and discovery process within academic databases and libraries. They can generate more relevant search results, suggest related resources, and assist in navigating vast amounts of scholarly information. This improves the efficiency and effectiveness of information retrieval for both students and researchers.
5	Personalized Assistance	GPTs can provide personalized recommendations and guidance to users. By analyzing user preferences, previous interactions, and learning patterns, AI-powered systems can offer tailored suggestions for relevant research materials, courses, or academic resources. This personalized assistance enhances the user experience and supports individual learning paths.



6	Ethical Considerations	The use of AI-based GPTs raises ethical concerns in the information collection process. These include issues of data privacy, security, and algorithmic bias. Higher education institutions must ensure that ethical guidelines are in place to safeguard sensitive information, address potential biases, and maintain transparency in the deployment of AI systems.
7	Evolving Role of Librarians	The integration of AI-based GPTs may reshape the role of librarians within the higher education system. Librarians may transition from being primarily information collectors to becoming facilitators, educators, and curators of knowledge. They can leverage AI technologies to provide guidance, instruction, and critical evaluation of information sources.
8	Continuous Learning and Adaptation	AI-powered GPTs require continuous learning and adaptation to remain effective. As the higher education landscape evolves, the underlying models and algorithms need to be regularly updated to reflect current academic trends, new research, and changing information needs. This necessitates ongoing training and development efforts for the AI systems used in information collection.

AI-based GPTs have the potential to revolutionize the information collection process in higher education. They offer increased efficiency, accessibility, and personalized assistance while necessitating careful consideration of ethical implications and evolving roles within the academic ecosystem. By embracing AI technologies responsibly, higher education institutions can harness the benefits of AI-based GPTs to support knowledge discovery, dissemination, and innovation.

**Suggestions and Precautions for Using AI-based GPTs for Academic Information Collection**

Based on above analysis, some suggestions and precautions are noted and listed for using AI-based GPTs for academic information collections:

- (1) **Use multiple sources:** AI-based GPTs can provide a wealth of information, but it's important to verify and cross-reference the information from multiple reliable sources. Relying solely on the output of a GPT model may introduce inaccuracies or biases.
- (2) **Evaluate credibility and bias:** Be aware of the potential biases in the training data of the AI model. Different sources may have their own biases as well. Take a critical approach and evaluate the credibility and objectivity of the information obtained from the AI-based GPT, especially when it comes to contentious topics or controversial claims.
- (3) **Understand limitations:** AI-based GPTs have limitations, such as not being able to provide real-time or domain-specific updates. Be aware of the knowledge cutoff date of the model and consider accessing more recent academic sources or consulting subject-matter experts for the most up-to-date information.
- (4) **Verify facts and references:** AI models generate text based on patterns and correlations in the training data, but they may not always provide accurate or properly cited information. Verify facts and cross-check references independently to ensure the accuracy and reliability of the collected academic information.
- (5) **Exercise caution with citations:** When using AI-generated text for academic purposes, exercise caution with direct citations. It is generally recommended to rely on authoritative and peer-reviewed sources rather than citing AI-generated content directly. Treat AI-generated text as a potential starting point for further research and analysis.
- (6) **Leverage human expertise:** While AI-based GPTs can assist in information collection, they should not replace the expertise and critical thinking of human researchers. Subject-matter experts, librarians, or academic professionals

can provide valuable insights, guidance, and context to supplement the information gathered from AI models.

- (7) **Keep ethical considerations in mind:** AI models should be used responsibly and in compliance with ethical guidelines. Ensure that the data used for training the model respects privacy and data protection regulations. Be cautious about using AI models to generate or manipulate academic content without proper citation or acknowledgment.
- (8) **Stay informed about AI advancements:** AI technology is rapidly evolving. Stay up to date with the latest developments in AI research, best practices, and potential limitations. This will help you make informed decisions about using AI-based GPTs for academic information collection.

By following these suggestions and precautions, one can harness the benefits of AI-based GPTs while maintaining a critical and responsible approach to academic information gathering.

## Conclusion

In conclusion, the utilization of AI-powered ChatGPT technology in academic libraries has both positive and negative consequences. On the positive side, ChatGPT enables swift and accurate responses to student inquiries, allowing library staff to allocate more time to complex tasks. Additionally, it extends the library's accessibility by catering to students beyond regular operating hours. However, there are also downsides to consider. These include the potential displacement of library staff, concerns regarding privacy and security in AI implementation, and the possibility of ChatGPT falling short in delivering personalized assistance compared to human personnel, consequently impacting the overall student experience.

Consequently, it is crucial for academic libraries to thoroughly contemplate the integration of ChatGPT technology, carefully weighing the advantages and disadvantages. While it holds the

potential to enhance efficiency and accessibility, it is essential to strike a balance between these benefits and the potential negative effects on staff and student satisfaction. By approaching the implementation of ChatGPT thoughtfully and strategically, academic libraries can optimize the benefits of this technology while minimizing any unfavorable outcomes. It can be argued that ChatGPT-based AI systems should complement, rather than replace, the entirety of physical and digital library systems.

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