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# Chatbot Design and User Acceptance as a Library Virtual Assistant

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**ABSTRACT**

This study aims to design and evaluate user acceptance of a chatbot as a virtual assistant in a library. The chatbot, called LibraX, was created using the Dialogflow platform to provide interactive services to library visitors, including answering general questions, providing book recommendations, and guiding collection searches. The research methods used include data collection through questionnaires and user trials with 60 respondents. The results showed that 94.67% of users found the LibraX chatbot easy to use and very well received by users. This study also identified suggestions from users for further development, such as the addition of book-ordering features and integration with the library's online catalog. In conclusion, the LibraX chatbot can improve the efficiency of library services and provide a better experience for visitors. The findings are expected to be a reference for libraries in developing services based on chatbot technology.

## 1. INTRODUCTION

The development of information technology has changed user behaviour in accessing information in the library. Library visitors no longer only come physically, but also need information services that can be accessed online. Chatbot, as a form of artificial intelligence, is a solution that can be utilized by libraries to meet user needs for fast and efficient access to information [1]. A *chatbot* is a computer program designed to dialogue with humans in a natural way, using artificial intelligence to understand user questions and provide appropriate responses. *A chatbot* can serve as a library's virtual assistant, assisting users in finding information, answering questions, and providing collection recommendations [2].

Although chatbots have great potential to improve library services, user acceptance of chatbots as library virtual assistants is still a concern. Some factors that can affect user acceptance include ease of use, usability, and user trust in the chatbot [3]. In addition, based on data in 2022, the number of internet users in Indonesia reached 213.3 million people or around 77.1% of the total population [4]. Meanwhile, the most common online activity is searching for information, with a percentage reaching 94.1%. [4].

Studies in 2021 show that 65% of libraries in the United States have implemented chatbots to help users [5]. Research in Europe in 2022 found that 52% of libraries have used chatbots to improve information services [6]. A survey in 2021 in academic libraries in Southeast Asia showed that 72% of users were satisfied with the library chatbot they were using [7] A 2022 study in public libraries in Europe found that 68% of users found chatbots easy to use and helpful in information retrieval [8]. Along with the increase in internet usage in society, users' needs for online information access in libraries are also increasing [4]. Recent research shows that 85% of library users expect information services to be accessible online [5], [9]. Chatbots have the ability to provide information services that are fast, responsive, and available 24/7. [10]. Recent studies show that 72% of libraries using chatbots report increased user satisfaction and service efficiency [7].

This research aims to design a chatbot that can function as a library virtual assistant. The chatbot is expected to assist users in finding information, answering questions, and providing recommendations for library collections. In addition, this research will also analyze user acceptance of the chatbot [2]. User

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acceptance of the chatbot as a library virtual assistant is an important aspect that needs to be considered. The chatbot must be well accepted and utilized by library users. This can be influenced by various factors, such as ease of use, usability, and user trust in the chatbot [3].

## 2. LITERATURE REVIEW

The development of *chatbots* in libraries based on artificial intelligence has become increasingly popular in various fields, including libraries. The development of chatbot technology enables libraries to improve service efficiency, provide faster access to information, and increase user satisfaction [11]. Research shows that the use of chatbots in libraries continues to increase, with many libraries implementing chatbots to assist users in searching for books, answering questions, and providing recommendations [5].

The increase in *chatbot* adoption is inseparable from user acceptance of library chatbots which is influenced by several factors, including user-friendliness where *Chatbot* is easy to use and understand by users, with a simple and intuitive interface [12]. Other factors include usability, trust, and personality [8], [13]

The development of *chatbots* in library services has great opportunities in the future with increased personality where *Chatbots* can be programmed to provide personalized recommendations based on search history and user preferences [14]. Another opportunity is Integration with Other Library Services where Chatbots can be integrated with other library systems, such as online catalogs and lending systems [5] Multilingual Chatbot development allows Chatbot to be developed to serve users with multiple languages, so that it can reach more users. .

## 3. METHODOLOGY

The research methods carried out in this study include, Needs Analysis, Design, Implementation, Testing and finally prototype evaluation. The following steps can be seen in Figure 1.


Figure 1. Research Method

### 3.1. Requirement Analysis

Data collection in this study was carried out using the Questionnaire method which aims to collect quantitative data regarding user perceptions, attitudes, and user experience towards library chatbots. Some indicators that are often measured are indicators of ease of use, usability, trust, and user satisfaction [1]. The data obtained will be used in the *pre-processing* stage before further use.

### 3.2. Design

The design stage is carried out before making a prototype, the stage that is carried out first is to design the system using a flowchart, use case diagram, to describe what functions are in the *chatbot* application.

### 3.3. Implementation

At this point, a prototype chatbot application is created using the previous design using the Artificial Intelligence Markup Language (AIML) method. AIML serves as the brain of the chatbot program, and the natural language processing that manages the input from the user.

### 3.4. Testing

After the chatbot application *prototype* is built, the next step is to test whether the application can run well or not. The evaluation method used is to use the blackbox testing method.

### 3.5. Evaluation

In this last stage, evaluation is carried out to see how the system works, features, and design can be an answer to the problems that have been found before, at this stage some conclusions can also be drawn about further development opportunities for this research prototype system

## 4. RESULT AND DISCUSSION

In this research, a chatbot named *LibraX* was designed to be a virtual assistant for library visitors. This *chatbot* is built using the Dialogflow platform, which allows the creation of interactive conversation flows and according to user needs. *LibraX* chatbot is equipped with the ability to answer general questions about the library, provide book recommendations, and guide visitors in finding book collections. The initial stage of making LibraX is by creating a telegram bot. Telegram bot creation is done by accessing *botfather*, a feature for creating bots on telegram. The server for activities on the bot uses replit with the Python programming language. The following process runs in the LibraX application, as shown in Figure 2 below.

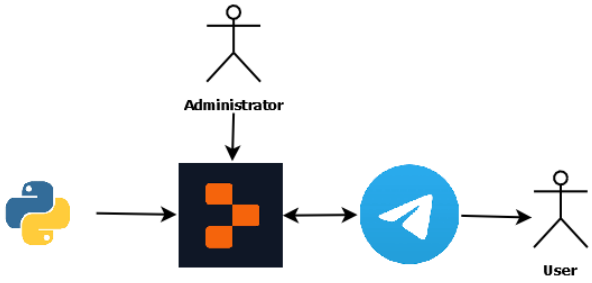


Figure 2. LibraX Chatbot Schema

In Figure 2, is a chatbot creation scheme that includes adding knowledge to the bot. The knowledge is stored in Replit and accessed by Telegram through Telebot tokens and libraries. After this configuration, users can access the information they need. The code for the chatbot was written using the Python programming language. Users can interact with the chatbot, while admins have the ability to update the chatbot's knowledge directly


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through rules in the AIML program. The knowledge used in the LibraX chatbot application is as in Table 1 below.

Table 1. Chatbot Insight

| No | Pattern | Answer template |
|---|---|---|
| 1 | Library operating hours | The library is open every day with operating hours Monday-Thursday at 08.00 AM-08.00 PM, and Friday-Sunday at 08.00 AM - 06.00 PM. |
| 2 | Library services | There are 5 services provided namely:<br>1. Book Borrowing and Returning<br>2. Reference and Information Retrieval<br>3. Copy and print service<br>4. Reading and Discussion Room<br>5. Internet Access and Technology Facilities. |
| 3 | Book collection | The library has a collection of fiction and non-fiction books covering a wide range of topics and genres, such as novels, biographies, history, science, technology, and others |
| 4 | Library Facilities | The facilities available are reading room, book collection, computer and internet access, photocopying and printing services, and presentation discussion room |
| 5 | Library membership | Requirements needed to register as a library member:<br>1. ID Card<br>2. Contact information<br>3. Photo pass<br>4. Registration fee |

After adding knowledge into the chatbot, the next step is to design and display the final interface of LibraX. To start the LibraX bot, it can be done by using the /start command in the telegram application. The initial display of the LibraX chatbot telegram can be seen through Figure 3 below.

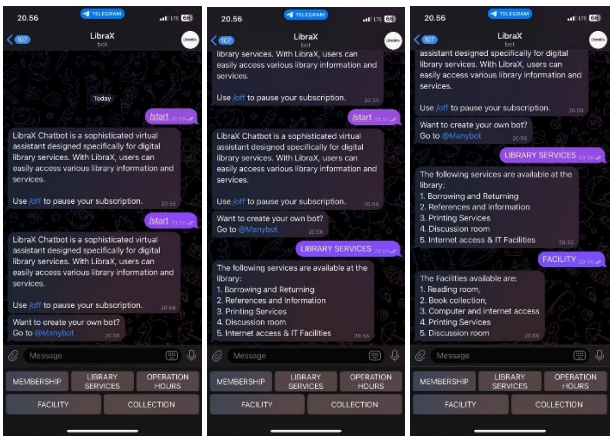


Figure 3. UI/UX LibraX Chatbot

The initial interface when entering LibraX bot displays the /start button where the start command is for instructions to start using the LibraX bot telegram. After the /start command the user will be presented with the main menu which contains Library service, Membership, Operation hours, Facility, and Collection. The menu becomes a shortcut button to get the information needed by users related to services and facilities in the library. When the user inputs according to the menu provided, the chatbot will display related information. The membership menu will display information on library membership registration requirements, while the library service menu will display services provided by the library to all users. The operation hour menu displays the library's operating hours along with announcements related to operating hours.

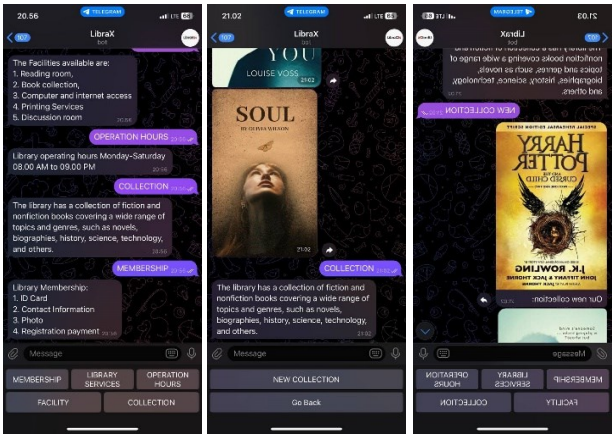


Figure 4. User Interface New Collection Menu on LibraX Chatbot

In Figure 4, displaying the latest book collection menu services in the library, users can access this latest collection through the "New Collection" menu on the chatbot.

After making the chatbot prototype, the next step is to test the chatbot using the blackbox method, where each function is tested by running the appropriate commands for each service. The test results show that all services can be accessed through the given commands. A summary of the test results can be found in Table 2 below.


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Table 2. Blackbox Testing

| No | Pattern | Answer template | Result |
|---|---|---|---|
| 1 | Library operating hours | The library is open every day with operating hours Monday-Thursday at 08.00 AM-08.00 PM, and Friday-Sunday at 08.00 AM - 06.00 PM. | Valid |
| 2 | Library services | There are 5 services provided namely:<br>1. Book Borrowing and Returning<br>2. Reference and Information Retrieval<br>3. Copy and print service<br>4. Reading and Discussion Room<br>5. Internet Access and Technology Facilities. | Valid |
| 3 | Book collection | The library has a collection of fiction and non-fiction books covering a wide range of topics and genres, such as novels, biographies, history, science, technology, and others | Valid |
| 4 | Library Facilities | The facilities available are reading room, book collection, computer and internet access, photocopying and printing services, and presentation discussion room | Valid |
| 5 | Library membership | Requirements needed to register as a library member:<br>1. ID Card<br>2. Contact information<br>3. Photo pass<br>4. Registration fee | Valid |

Based on testing conducted with the blackbox method, a value of 100% was obtained. This shows that the chatbot application developed can answer questions well, according to the knowledge that has been given. The more knowledge that is added, the more questions the chatbot can answer. In addition to blackbox testing, *User Acceptance Test* (UAT) testing was also carried out, which is an evaluation process carried out by users to ensure that the system meets user needs. UAT was conducted involving 60 respondents. The results of the *User Acceptance* Test are rated in 5 categories, namely VS (Very Suitable), S (Suitable), LS (Less Suitable), NS (Not Suitable), and NA (No Answer). The results are shown in Table 3 below.

Table 3. User Acceptance Test

| No | Questions | VS | S | LS | NS | NA |
|---|---|---|---|---|---|---|
| 1 | Does this app help and make it easier for users? | 40 | 14 | 6 | - | - |
| 2 | Attractive chatbot display | 50 | 5 | - | - | - |
| 3 | This chatbot helps get library service information | 48 | 12 | - | - | - |
| 4 | The answers from the chatbot are easy to understand | 52 | 8 | - | - | - |
| 5 | The chatbot application is efficient in searching and finding information about library services | 48 | 16 | 4 | - | - |

Based on the User Acceptance Test results, the analysis shows that the question at the first point obtained a percentage of 91.33%, followed by the second question with a percentage of 96.67%, the third question 96%, the fourth question of 97.33%, and the last question with a percentage of 92%. Thus, it can be concluded that the average of the analysis results for all questions in the test is 94.67%.

## 5. CONCLUSION

Overall, this research shows that designing a chatbot using the dialogflow platform can produce an interactive library virtual assistant that can be well received by users. Chatbot "LibraX" is proven to be able to assist visitors in accessing library information and services effectively. The results of this study can be a reference for libraries in developing chatbot technology-based services to improve user satisfaction and experience. The implementation and testing results show that this chatbot works well, with 100% valid results in blackbox testing and 94.67% in UAT testing. The use of the Artificial Intelligence Markup Language (AIML) method makes it easier for the chatbot to answer the questions asked, according to the knowledge that has been entered.

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