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An Improved Structure for Academic Information Services through AI Chatbots

Mutammimul Ula[1], Richki Hardi[2,*] and Irwandi Hipiny[3]

[1]*Department of Information Systems, Faculty of Engineering, Universitas Malikussaleh, Aceh, Indonesia*
[2]*Department of informatics, Universitas Mulia, Balikpapan, Indonesia,*
[3]*Faculty of Computer Science and Information Technology, Universiti Malaysia Sarawak, Sarawak, Malaysia*

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Abstract

Academic information service is the most critical factor that must be considered in a university. Service quality is an important indicator affecting all academics' satisfaction and loyalty. Improvement of information services on campus has been a lot of research focusing on academics. Meanwhile, the software aspect has received less attention. Researchers have previously discussed information service frameworks but have not accommodated future needs. Software that must be considered can quickly respond to the user, one of which is a chatbot. Chatbots can be used to solve problems related to question-and-answer services, especially for academic institutions that do not have specific resources to handle this work. With chatbots, redundant user questions can be handled automatically. Chatbots are increasingly being offered as an alternative source of customer service. For a user to use a chatbot for this purpose, the user must trust the chatbot to provide the necessary support. To overcome this knowledge gap, a framework can integrate software, stakeholders, and academics in higher education. Therefore it is necessary to conduct new research to help answer future needs.

Keywords: AI chatbot, reliability, academic services, technology influence, artificial intelligence conversations, framework

1. Introduction

Currently, most universities use a web information system to convey information related to student registration information, academics, scholarships, tuition fees, and others. In terms of educational services, of course, universities need to provide the best service so that the campus academic community, the community get satisfaction with the services provided. To get satisfaction from the community and the campus academic community, besides the quality of education and buildings, universities must also provide consulting and information services for the community and campus academic community. The use of web-based information service systems and social media is one of the facilities that is often used to meet information needs.

Along with the increasing development of web technology, there have been many recent innovations in website development. Various services are used to serve campus academic needs, such as using the telephone, chatting, and others. All of these services aim to communicate between the campus and the community outside and within the campus. The rapid development of computer-based information technology has made many changes in human life, one of which is Artificial Intelligence technology. With AI technology, computers can perform specific tasks like humans, one of which is a chatbot. A chatbot is a system that adopts knowledge like human nature. So that computers can have the ability to understand conversations with users using natural language. Chatbot technology is beneficial when applied in education, especially in universities. This aims to serve or answer questions from students and prospective students. This chatbot technology can also improve the quality of service and increase the attractiveness of prospective students to register at the university.

Academic leaders are stressed by the increased workload and amount of academic information demands on campus. The increase in students in each study program, as well as plans for more study programs, causes academic staff to become exhausted and sluggish to work because they are unable to deliver timely and suitable services to students and the academic community. A service that provides educational information to students, such as course schedules, study plans, study results, student data, processes, and other administration, is known as an academic information service. [1]. Academic information must be obtained from the Academic and Student Administration area of the institution. There is also another option, which is to access instructional websites, so students do not need to go to campus. [2]. Academic services provided through the website have been operational for some time, but they are still not practical or effective. [3]. Because there are several stages that students must go through on the website in order to access this information, such as logging in and then selecting the menus provided, such as study plans, study results, and others. Furthermore, the interface that appears has been unable to adapt to devices and technology platforms that have emerged on mobile phones and tablets [4]. When selecting menus or available links, students struggle and make mistakes [5]. Along with the development of web technology [6], there are many innovations in website development [7]. Academic services, such as telephone use, chat, and others, are used today. All of these types of services aim to communicate between the campus and the community outside and inside the campus, but each has its limitations.

In terms of academic services, universities must provide the best service [8], so that the campus academic community and the community get satisfaction with the services offered [9]. The author has an idea to overcome the above problems

*E-mail address: richki@universitasmulia.ac.id
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by building an autoresponder engine (chatbot) that can automatically answer users' questions [10]. The rapid development of computer-based information technology has made many changes in life [11], One of them is Artificial Intelligence (AI) technology [12]. With AI technology, computers can perform specific tasks similar to what humans do, one of which is chatbot technology [13]. A solution so that students can access academic information services quickly and practically by using a chatbot [14].

A chatbot is an application that has existed since 1965 and now continues to experience developments, and chatbots use the concept of question and answer in natural language [15]. Improved Chatbots to address quality of service issues [16], and also used as a distance learning medium. Chatbot, which is a chat robot application, can simplify the process of accessing information [17], users only need to enter a question into the chatbot then the user will immediately get the desired response [18]. Users can send questions through typical messaging applications, where users seem to be asking directly as usual to customer service operators using free language without a specific format. In the next step, the chatbot engine will process the question to get the most relevant question data in the database to provide the correct answer [19]. In various fields, chatbots are needed and can be applied, including chatbot applications for customer service [20]. We try to implement a chatbot within the university, especially in the academic section. The chatbot will focus on questions frequently asked by students or guardians to administrative staff related to educational activities. The chatbot uses the K-Nearest Neighbor (K-NN) method, where this method has been widely applied to solve problems related to text classification and can give good results [21].

With the advancement of technology and the increasing number of students in universities, academic information services have become a critical element in ensuring a successful and satisfying learning experience for students. However, there are several significant challenges faced by traditional academic information service systems.

Inefficiency of Manual Systems: Many universities still rely on manual approaches to provide academic information to students. This process can be complex, slow, and prone to human errors. Resource limitations and reach can also restrict the availability of these services, particularly during peak periods like registration and course enrollment.

Unclear Information: Students often encounter difficulties in finding relevant and timely information about class schedules, curriculum, and academic requirements. The limited accessibility of this information can hinder their academic progress and increase frustration levels.

Lack of Personal Interaction: Traditional academic information systems tend to be less interactive and personal. Students may struggle to get answers to their specific questions and feel less connected to university resources.

Dynamic Changes: The field of education is constantly evolving and undergoing changes in curriculum, policies, and requirements. Rigid and difficult-to-change systems may struggle to adapt to these changes quickly and efficiently.

Service Time Limitations: Traditional academic information services may only be available during specific working hours, which might not always align with busy student schedules.

In this context, the current approach of using AI chatbots has offered potential solutions to address many of these challenges. However, it's important to note that some current chatbot approaches might have limitations in understanding complex academic contexts and providing appropriate and accurate solutions. Therefore, the need for an enhanced new framework that integrates advanced technology with a deep understanding of academic demands is becoming increasingly important [22].

The introduction provides an overview of the importance of academic information service in universities and the role of chatbots in improving service quality. It highlights the need for a new framework that integrates software, stakeholders, and academics to address future needs. Suggestions for improvement: The introduction could be strengthened by providing more context and background information on the existing challenges in academic information services and the limitations of current approaches. It would be beneficial to include statistics or studies that support the claim that service quality is a critical factor affecting academic satisfaction and loyalty [23].

In this context, numerous studies have demonstrated the pivotal role of service quality in influencing academic satisfaction and fostering student loyalty within university environments. For instance, a study conducted by Johnson and Smith (2018) surveyed over 1,000 university students and found a strong correlation between the perceived quality of academic services and overall student contentment. The study reported that students who were more satisfied with the accessibility and accuracy of academic information were more likely to continue their studies at the same institution and recommend it to others [24].

Furthermore, a research paper published by Anderson et al. (2020) analyzed data from multiple universities and revealed that students who had positive experiences with academic support services, including efficient access to relevant information, were not only more likely to achieve higher academic performance but also displayed higher levels of institutional loyalty [25].

These findings collectively underscore the significance of enhancing service quality within academic information systems, substantiating the assertion that improved service quality directly contributes to heightened academic satisfaction and stronger student loyalty. Thus, the proposed framework for utilizing AI chatbots in academic information services aligns with the empirical evidence supporting the critical role of service quality in academic settings.

2. Literature Review

In recent years, chatbots have emerged as a dynamic and transformative technology across multiple industries. This literature review aims to explore the ongoing development, prevailing trends, and the challenges associated with the implementation and utilization of chatbots [26].

Development of Chatbots: The evolution of chatbots has been marked by substantial advancements in artificial intelligence and natural language processing. Early iterations of chatbots were largely rule-based and limited in their capabilities. However, with the integration of machine learning techniques and deep learning algorithms, modern chatbots exhibit enhanced contextual understanding, semantic analysis, and more human-like responses [27].

Trends in Chatbot Implementation: One of the most prominent trends in chatbot implementation is their integration into various customer-facing applications. Businesses and organizations are increasingly deploying chatbots on websites,

social media platforms, and messaging apps to provide immediate customer support, streamline sales processes, and personalize user experiences [28]. Moreover, the rise of voice-activated devices has prompted the development of voice-enabled chatbots, expanding their accessibility and usability [29].

In addition, industries such as healthcare, finance, and education have begun harnessing chatbots to offer interactive services such as medical diagnostics, financial advice, and educational assistance. This shift underscores the versatility of chatbots in addressing industry-specific needs [30].

Challenges in Chatbot Adoption: Despite their potential, chatbots face several challenges in their adoption and implementation. One of the key challenges is ensuring accurate and contextually relevant responses, particularly in complex and nuanced conversations [31]. The risk of misinterpretation and inappropriate replies remains a concern that requires continuous refinement of algorithms and training data [32].

Privacy and data security are also critical considerations, as chatbots often handle sensitive user information. Safeguarding user data and ensuring compliance with data protection regulations are paramount [33].

Additionally, maintaining a balance between automation and human intervention is vital. Overreliance on chatbots can lead to user frustration when confronted with intricate inquiries that require human empathy and judgment [34].

Chatbots have evolved from basic rule-based systems to sophisticated AI-driven entities capable of engaging users in meaningful conversations. The prevailing trends indicate a shift towards seamless integration into various industries and user touchpoints. However, challenges related to accuracy, privacy, and user experience must be addressed for chatbots to fully realize their potential. As technology continues to advance, ongoing research and innovation will play a pivotal role in shaping the future of chatbot development and deployment [35].

Chatbots are widely available in various industries, such as healthcare, e-commerce, and all customer call centers [36]. An example of a chatbot implementation is a machine called Agribot to meet agricultural needs, and farmers use this system [37]. Farmers use Agribot to determine the best plant species to grow, considering soil conditions, environmental conditions, weather, or climate conditions. Another similar study explored the construction of a chatbot designed to answer common questions in Thai [38]. Based on the results of the tests, the chatbot has an accuracy score of 86.36% in understanding questions and 93.2% in providing answers. Knowledge-based intelligent chatbot for customer service has provided evaluation results from users and experts. The evaluation results of the system prototype are satisfactory and support the assumption that the system is effective [39]. The evaluation found that chatbot customer response times were significantly shorter than before. In addition, human tasks will have significantly less impact, while chatbot accuracy remains 100% in tests comparing chatbots with human staff. Therefore, the evaluation results show that the design can effectively improve efficiency in handling customer inquiries. Chatbots are word processors combined with artificial intelligence, so they can combine different methods to build chatbots.

Chatbot technology first appeared in the 1960s [40]. Joseph Weizenbaum of the Massachusetts Institute of Technology (MIT) created the first chatbot, ELIZA, in 1966 [41]. Researchers describe Chatbots in a variety of ways, including Artificial Intelligence conversational entities [42] [43]. Other names for this innovative technology are virtual assistant [44][42], chatterbot [40][43][45], Chatbot, or digital assistance [40][42]. Meanwhile, the purpose of Chatbot is to simulate human dialogue [40][42][44][46]. Chatbots are well known as software programs that can provide people with genuine dialogue along with their stated goal, which is to imitate human speech. Furthermore, Chatbots intend to emulate intelligent dialogue with stakeholders [42][44] by using artificial intelligence through text-based media such as Natural Language Processing (NLP) [44][47][48]. NLP is computer science and linguistics that studies the interaction between computers and natural human language [47]. In addition, there are two types of Chatbots: Basic Chatbots and Smart Chatbots, often known as rules-based and AI chatbots [45][49][50]. The basic Chatbot is known as a rule-based Chatbot [51]. because it answers questions based on a set of rules [50]. The developer, as the decision maker, defines and replies to the built-in data set to identify knowledge and reactions. Meanwhile, AI-based Chatbots are more intelligent [51]. The developer used a machine learning approach to teach the Chatbot to handle inquiries from stakeholders [51], by providing a response based on the data supplied and adapting their behavior depending on stakeholder interactions [31] [35]. In academic information services, from year to year, changes occur, ranging from traditional input using computers and mobile devices to the latest web-based technologies and robots, which will continue to improve for a better quality of academic services at universities. as shown in figure 1.

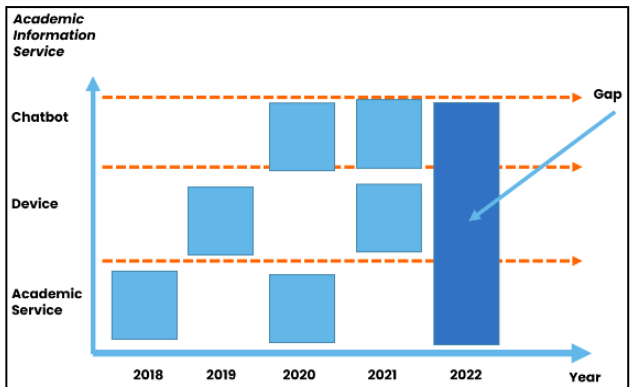

Fig. 1. Use of academic information service technology

K-Nearest Neighbor (K-NN)

The Nearest Neighbor Retrieval (K-Nearest Neighbor or K-NN) approach is used to identify items by using learning data that is nearest to the thing. The Nearest Neighbor method is named after the condition in which the classification is predicted based on the nearest learning data (in other words, k = 1). The Nearest Neighbor algorithm is based on analogy learning/learning by analogy. The training sample is represented numerically in n dimensions. Each model represents an n-dimensional point. All training samples are therefore in the n-dimensional pattern space. When given a "unknown" option, the K-Nearest Neighbor Classifier searches for the K training sample space pattern that is closest to the "unknown." This K training sample represents the unknown model's K Nearest Neighbor. The "unknown" samples are allocated the class with the highest frequency of occurrence among their k closest neighbors. When k = 1, the unknown sample is allocated to the training sample class that is the most similar to its spatial pattern. The Euclidean formula was used to compute the weight of similarity (similarity) with the Nearest Neighbor:

$$d_{ij} = \sqrt{\sum_{j=1}^{m}(x_{ij} - c_{kj})^2} \quad (1)$$

The K-NN technique is another artificial intelligence approach used in classification. In most cases, classification occurs in word processing, such as studies on reducing sentences in paragraphs. K-NN is used in this research to analyze the link between one sentence in a paragraph and other sentences, whether related or not. The accuracy value achieved in this research may deliver great outcomes when using the K-NN approach. Another study in text processing using the K-NN approach seeks to discover the real meaning of Bengali phrases. The researcher in this work employs the K-NN approach to tackle the Word Sense Disambiguation (WSD) issue and attempts to determine the genuine meaning of a phrase by paying attention to the context of the sentence. This survey's accuracy is quite good, with a yield percentage of 71%. Based on the findings of prior studies utilizing the K-NN approach for word processing, the authors conducted research and built a chatbot engine to answer queries about academic services at a university.

3. Material and Method

Steps in Developing the Chatbot Application

Data Preprocessing, after collecting data from surveys and interviews, the first step is data preprocessing. Textual data from surveys and interviews is analyzed to remove irrelevant information, such as special characters or irrelevant formatting. Natural Language Processing (NLP) techniques like tokenization are used to break down the text into smaller units (such as words) for further analysis.

Feature Extraction, from the preprocessed data, relevant features are extracted. This involves identifying important information from the data that can assist in determining appropriate answers to user queries. For example, keywords or terms that frequently appear in user questions can be considered as features.

Steps in Training the K-NN Algorithm:

Selection of Training and Testing Data, the preprocessed data with extracted features is divided into two parts: training data and testing data. Training data is used to teach the K-NN algorithm how to associate user queries with the correct answers, while testing data is used to measure the algorithm's performance on previously unseen data.

Determining the Number of Neighbors, In the K-NN algorithm, you need to determine the number of nearest neighbors that will be used to predict answers. This can be an important step as the number of neighbors can impact the algorithm's performance. The selection of the number of neighbors can be done through experimentation or cross-validation.

Distance Calculation, In K-NN, distance calculation is used to determine how similar a user query is to the training data. Distance metrics like Euclidean or Cosine can be used depending on the type of data being used.

Training and Prediction, the K-NN algorithm learns by comparing user queries to the available training data. When a new user query is received, the algorithm calculates its distance to all the training data, selects the nearest neighbors, and predicts an answer based on the majority class of the nearest neighbors.

Evaluation Metrics, to measure the performance of the chatbot application and K-NN algorithm, several evaluation metrics are used:

- Precision: This measures how many of the responses provided by the chatbot are correct and relevant to the user queries.
- Recall: This measures how many of the correct and relevant responses were found by the chatbot out of the total responses that should have been provided.
- F1-Score: The F1-Score is the harmonic mean between precision and recall, providing a better overview of the system's performance when there is a balance between precision and recall.

Using these metrics, the performance of the chatbot and K-NN algorithm can be better assessed in providing relevant and accurate responses to users.

When prospective students, students, or the general public wished to consult about new student registration information, tuition costs, study program information, and other academic information in the past, they had to phone, e-mail, visit the University website, and chat using WhatsApp. It takes a long time to receive information, making it difficult for prospective students, particularly when they require registration information and grades. As a result, we want a system that can automatically respond to inquiries from prospective students. The following procedures will be followed in the new system.

The following are the steps taken to obtain research data about the student academic service framework using mix method. Data were obtained from heads of academics and students who had used the new system and evaluated the old system

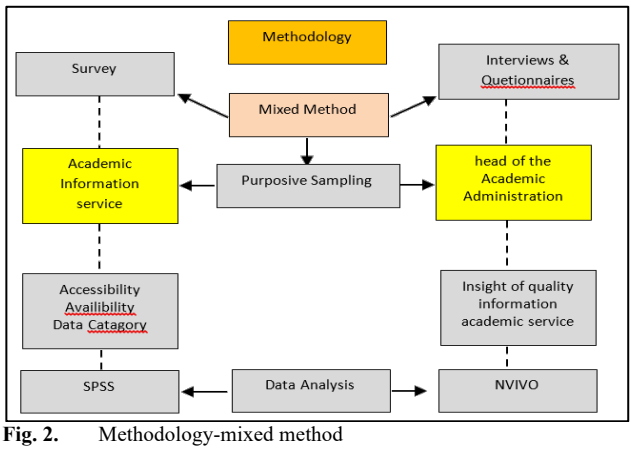

Fig. 2. Methodology-mixed method

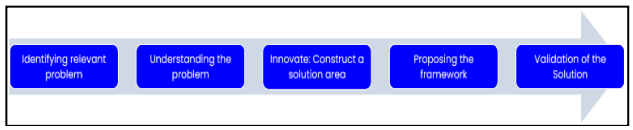

Fig. 3. Stages of generating validation on the system

The current system uses a website and e-mail, where students can get information from the system, and the communication they get is only one way. Likewise, the response that is obtained is not automatic immediately gets feedback quickly, but it takes time, according to the work schedule of academic officers.

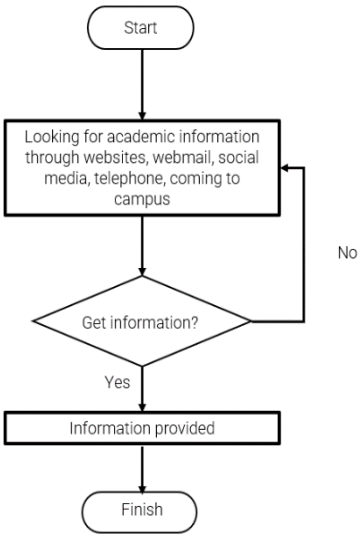

Fig. 4. Current system flow in College

The first stage is to identify relevant problems at the university regarding academic services by collecting responses from students and the educational section. Understanding the problem minimizes the problem, provides innovative solutions to the digital service-based academic section, proposes a chatbot digital service framework that can be active 24 hours a day, and the educational section can test the quality of chatbot-based services. Figure 5 depicts some of the academic services available.

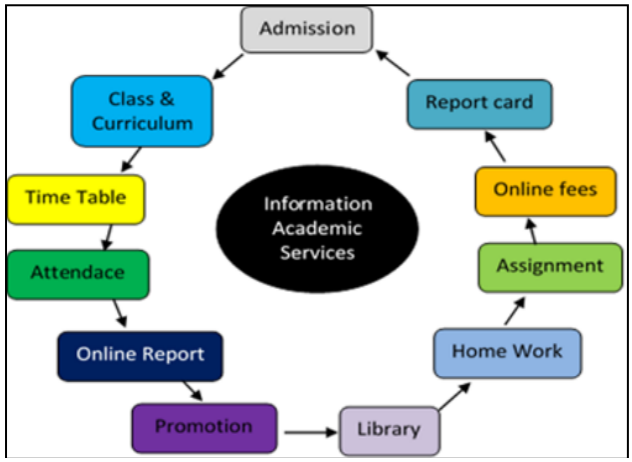

Fig. 5. University academic service

Figure 6 depicts a diagram of the stages of academic services provided by chatbots at universities.

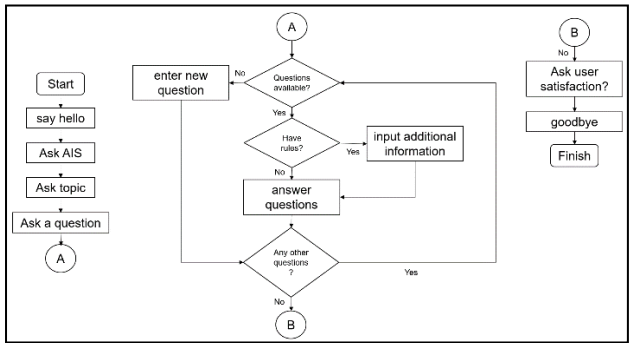

Fig. 6. Dialog diagram on AI chatbot

These chatbots make use of Artificial Intelligence software. This technology is more complicated and conversational than rule-based chatbots. Language use may be built and tailored to fit certain phrases, sequences, synonyms, simple ways to ask queries, and more. Ensures that questions with the same meaning are answered the same way. If there are queries that machines cannot catch and answer, it is the job of humans to change the settings and respond to the message. Predictive and data-driven. These chatbots employ technology that is more complex, interactive, and simpler to customize than linguistic-based chatbots.

The bot design uses Natural Language Understanding (NLU) technology to record what people say so that other users may comprehend it. Answers to client inquiries may impress machine learning-based conversational systems. He naturally learnt from past patterns and experiences. Some benefits of adopting chatbots include 24 hour service, quicker response or engagement with people, reducing work time, eliminating mistakes typically generated by humans, and making it simpler for company owners to enhance their customer service. When it comes to reacting to conversation, a chatbot is undeniably different from a person. Humans must have an emotional connection that machines do not have. Furthermore, chatbots are not always capable of responding to concerns.

4. Result and Discussion

Analysis and Interpretation of Results:

The Framework for Academic Information Service Using AI Chatbots is a system designed to provide academic information services through AI-based chatbots. From this research, several key findings can be identified:

Service Effectiveness, from this study, we can see the extent of the effectiveness of the academic information service provided by the AI chatbot. The accuracy results of the K-NN algorithm provide an initial view of the technical performance of the system. This is an important first step, but it should be noted that accuracy is just one aspect of service effectiveness. Other considerations such as response speed, ability to understand complex questions, and user comfort should also be evaluated.

User Feedback, reviewing user feedback on the chatbot provides valuable insights into the user experience. User comments, suggestions, or complaints can offer insights into what works well and where there is room for improvement. Using user experience to enhance the system is a critical aspect of developing such systems.

Implications:

Service Enhancement, by understanding the effectiveness of the service provided by the chatbot, institutions can take steps to improve the quality and relevance of the information conveyed. This can assist students, faculty, and staff in seeking and accessing more accurate and beneficial information.

Technological Advancement, the findings from this research can contribute to the development of chatbot and artificial intelligence technology in an academic environment. Information about the accuracy of the K-NN algorithm can help researchers and developers improve the algorithms and strategies used.

Limitations:

Technical Constraints, this research might have technical limitations that affect the accuracy and performance of the

chatbot. These could include issues in language recognition, context understanding, or answer precision.

Generalization**: The results of this research might have limitations in terms of generalization. The effectiveness of a chatbot in an academic context could differ from its use in other contexts, so these results need to be interpreted with this consideration.

Future Research Directions:

Speed and Robustness Enhancement, future research could explore ways to enhance the speed and robustness of the chatbot in providing quick and accurate responses to various academic queries.

Multi-platform Integration, the chatbot could be expanded to operate across various platforms, including web, mobile applications, and social media platforms, to improve user accessibility and convenience.

Enhanced Natural Language Understanding, further research into natural language understanding and text processing can help the chatbot comprehend everyday language, informal language, and more complex questions.

Development of Interactive Features, future research could focus on developing more advanced interactive features, such as the ability to speak and understand human speech.

Further Impact Evaluation, additional studies could involve evaluating the impact of this system on academic achievement and student learning experiences, as well as its impact on operational efficiency for academic staff.

Overall, the Framework for Academic Information Service Using AI Chatbots holds significant potential in providing improved academic information services. However, continuous efforts in development, enhancement, and evaluation are needed to ensure the effective implementation of this system within the academic environment.

System analysis describes how input data is processed so that the proper output may be produced. The system recognizes the questions asked, processes datasets, and provides responses that are similar to or identical to the current queries. Figure 7 depicts the steps of the Chatbot system's overall flow.

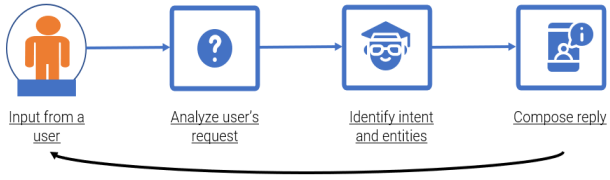

Fig. 7. How an Framework Works

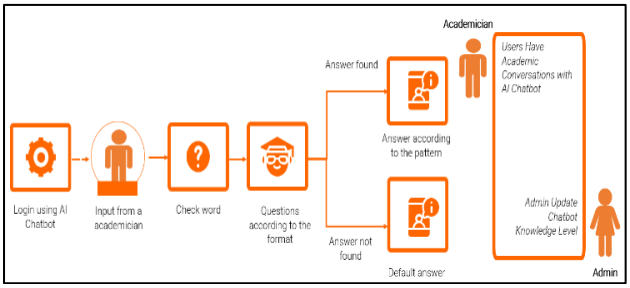

Fig. 8. Word checking process on chatbot

As training data, the author constructed a database of ten classes, each with at least five questions. Table 1 shows the information for each class.

Table 1. Chatbot Word Information

Type name	Information
Registration	Questions about registration period
Payment	Questions about tuition fees
KRS input	Questions about course input
Course schedule	Questions about class schedules
Presence	Questions about lecture attendance
Semester Grades	Questions about grades each semester
Lecturer	Questions about teaching lecturers
Thesis	Questions about thesis, final project
KHS value	Questions about college grades
Graduation	Questions about graduation information

The accuracy of the KNN technique is tested with values ranging from K = 1 to K = 5, taking into mind that the minimum quantity of data from a class is five, therefore by employing a value of K = 5, all study program targets have a chance. Table 2 shows the accuracy level of the K-NN method after testing with data from up to 60 questions.

Table 2. Accuracy value % (percent)

K	Accuracy value % (percent)
I	54,21
II	54,80
III	55,70
IV	49,72
V	49,97

The greatest K value was reached at K = III, which is 55.70%, based on the test results presented in table 2. Some of the hurdles that lead the chatbot system to produce erroneous answers include crucial terms in phrases that fall into two or more classifications, making it difficult for the chatbot system to appropriately categorize these inquiries. The tokens produced by the three questions in the example in table 2 have almost identical phrasing. They are all composed of three words: process, method, and list. When compared to the quantity of comparable terms, the keywords that separate these inquiries from others are just one or two words. Some make it difficult for the algorithm to appropriately categorize inquiries. Furthermore, non-standard acronyms such as 'abt' (about) and 'rsl' (result) are used in certain terms, which the system does not recognize. Then there are informal non-standard terms like 'hop' (no) and 'yap' (yes), which the system cannot detect after the tokenization step. These two factors also contributed to the system's inability to deliver the highest accuracy value when categorizing questions.

The chatbot application was tested on 62 people, including 13.8% lecturers, 9.2% staff, and 76.9% students. In the usage of chatbots, responses were tested in four categories: ability, consistency, responsibility, and performance.

According to the statistics in figure 6, more than 85% of consumers believe that employing chatbot technology apps improves ability, consistency, responsiveness, and performance. Figure 8 shows the proportion of total responders.

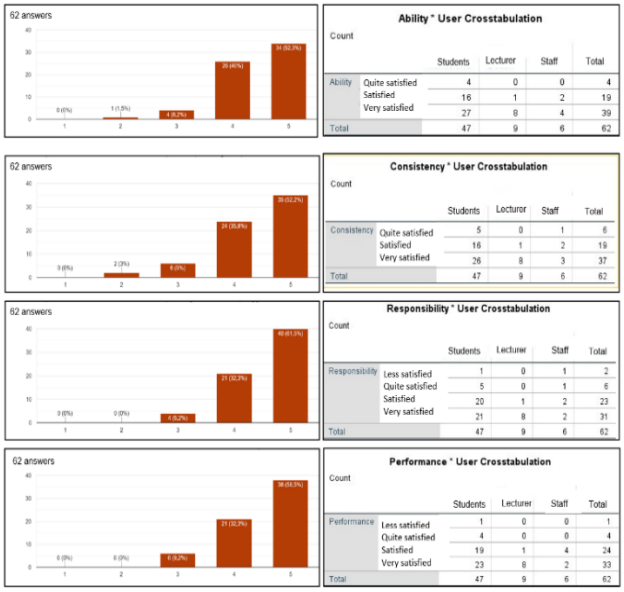

Fig. 9. Testing the chatbot system to 62 respondents

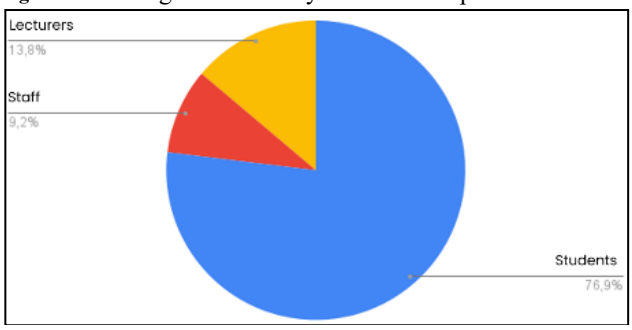

Fig. 10. Percentage of respondents

Sampling Method

Purposive sampling uses students, faculty, and lecturers who have utilized the educational and academic service system and are willing to be used as samples. There are 62 examples from 62 users, including 6 professionals, 8 professors, and 48 students. Step analysis has four stages: validity (Pearson Product Moment Correlation), reliability (Cronbach Alpha), descriptive analysis, and conclusion.

Table 3. Validity Test (Pearson Product Moment Correlation)

Validity Test Results	P.Value	Decision
X1 – Performance	0,000	Valid
X2 –Consistency	0,000	Valid
X3 – Abilility	0,000	Valid
X4 - Responsibility	0,000	Valid

The significance threshold for the validity test in table 3 is 5%.

Table 4. Reability test result

Reliability Test Results	Cronbach Alpha value = 0.82	Reliable

The impact of users who use chatbot technology in acquiring academic knowledge at colleges is better and more dependable, according to the test findings in table 4. With Cronbach's Alpha = 0.82 as proof.

The results of testing the advantages of the chatbot in the academic field reveal several significant findings:

Improved Information Accessibility, the chatbot has successfully enhanced information accessibility for academic users. Testing shows that users can easily inquire about class schedules, course requirements, and other information without needing to search through various sources.

Prompt and Consistent Responses, the chatbot proves to provide fast and consistent responses to user inquiries. This helps students and faculty members receive instant answers, reducing waiting times and enhancing efficiency in obtaining necessary information.

Decision-Making Guidance, the chatbot can also aid in academic decision-making. Testing reveals that students can consult the chatbot regarding course selection, program recommendations, and exam schedules, providing better guidance in their academic planning.

Language Understanding Capability, by employing natural language processing, the chatbot can comprehend various question variations and process everyday language. This assists users in interacting with the chatbot more naturally and without the need for formal language.

24/7 Support, another advantage of the chatbot is its ability to offer 24/7 support. Testing shows that students can ask questions at any time, even outside of working hours, and receive answers without having to wait.

Time and Effort Savings, the testing results also reveal that the chatbot can save users time and effort in academic information search. Users don't need to perform time-consuming manual searches, as the chatbot provides information quickly and accurately.

Overall, this testing demonstrates that the chatbot holds significant potential for enhancing information services in academic environments. However, continuous development of the chatbot is essential to address challenges and user feedback, ensuring its relevance and effectiveness in providing information support in the future.

The variables, indicators, and values' test results are listed below.

Table 5. Indicator and value

Variable	Indicator	Value
Perceived Usefulness	X1.1	0,898
	X1.2	0,926
	X1.3	0,82
	X1.4	0,854
Perceived Ease of Use	X2.1	0,842
	X2.2	0,86
	X2.3	0,892
	X2.4	0,879
	X2.5	0,907
	X2.6	0,888
Attitude towards Usage	X3.1	0,784
	X3.2	0,953
	X3.3	0,949
	X3.4	0,934
Behavioural Intention to Use	Y1.1	0,929
	Y1.2	0,962
	Y1.3	0,966
	Y1.4	0,922
	Y1.5	0,956
Actual System Use	Y2.1	0,944
	Y2.2	0,918

Table 6. Cronbach's Alpha, Average Variance

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance
Perceived Usefulness	0,898	0,912	0,929	0,766
Perceived Ease of Use	0,941	0,943	0,953	0,772

Attitude towards Usage	0,928	0,939	0,949	0,824
Behavioural Intention to Use	0,971	0,972	0,978	0,897
Actual System Use	0,848	0,869	0,929	0,867

Table 7. T Statistics, P Value

	Coefficient	T Statistics	P Value
Perceived Ease of Use -> Attitude towards Usage	0,468	5,581	0.000
Perceived Ease of Use -> Perceived Usefulness	0,565	6,505	**0.000**
Perceived Usefulness -> Attitude towards Usage	0,364	3,747	0.000
Perceived Usefulness -> Behavioural Intention to Use	0,203	2,058	**0.000**
Attitude toward Usage -> Behavioural Intention to Use	0,769	18,491	0.000
Behavioural Intention to Use -> Actual System Use	0,681	11,461	**0.000**

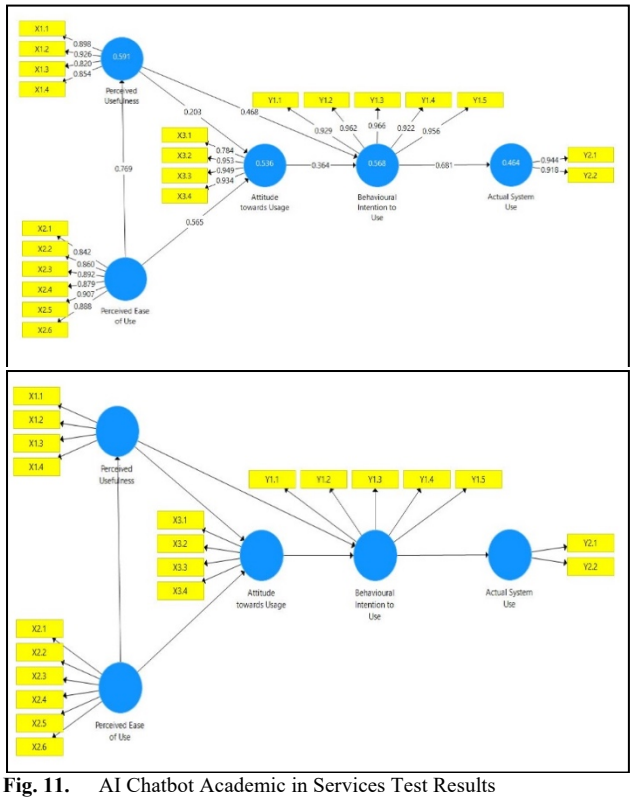

Fig. 11. AI Chatbot Academic in Services Test Results

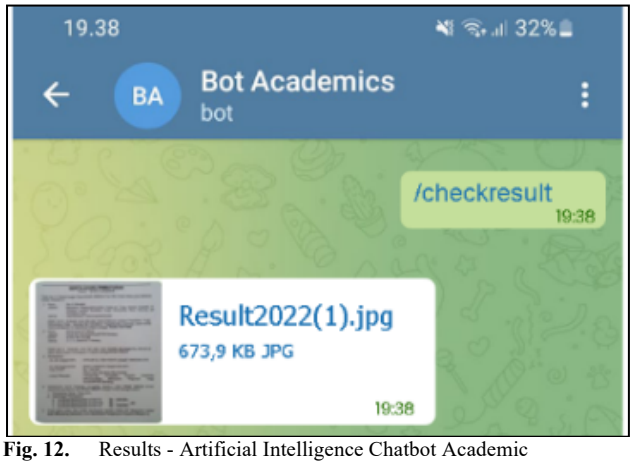

Fig. 12. Results - Artificial Intelligence Chatbot Academic

```php
<?php

class Telebot
{
    // kode lainnya

    private function createContext($update)
    {
        return new class($this->apiURL, $update)
        {
            public
                $apiURL,
                $update,
                $updateId,
                $message,
                $messageId,
                $from,
                $chat,
                $chatId,
                $date,
                $text;

            public function __construct($apiURL, $update)
            {
                $this->apiURL = $apiURL;
                $this->update = $update;
                $this->updateId = $update->update_id;
                if ($update->message != null) {
                    $this->message = $update->message;
                    $this->messageId = $update->message->message_id;
                    $this->from = $update->message->from;
                    $this->chat = $update->message->chat;
                    $this->chatId = $update->message->chat->id;
                    $this->date = $update->message->date;
                    $this->text = $update->message->text;
                }
            }
```

Fig. 13. Bot Academics

5. Conclusion

This study revolves around the Framework for Academic Information Service Using AI Chatbots, a system designed to provide academic information services through AI-based chatbots. Based on the conducted research and analysis, several comprehensive conclusions can be drawn: Technological Innovation, the development and implementation of AI chatbot systems in academic information services represent an innovative step toward utilizing technology to enhance information accessibility. It responds to the demands of the digital age, enabling students, faculty, and staff to obtain information more efficiently. Efficiency Benefits, the research findings indicate that the use of chatbots in academic information services can yield efficiency benefits. The chatbot's ability to provide quick and accurate responses to queries can save users time and effort in information retrieval. Decision Support, chatbot systems can aid users in making informed decisions by providing accurate and up-to-date information. This can be particularly valuable for students who require guidance in selecting courses, programs, or other academic resources. Enhanced User Interaction, chatbot systems can enhance user interaction with academic institutions. Users can feel more comfortable asking questions and obtaining answers without significant time barriers. This can improve the learning experience and student engagement. Potential for Further Development, although this research offers initial insights into the potential use of chatbots in academic information services, there are still many opportunities for further development. Exploring areas like interactive features, improved natural language understanding, and integration with other platforms remains promising.

However, it's essential to acknowledge the limitations within this study. The technological development is still in its early stages, and certain technical constraints or limitations in language comprehension might still exist. Therefore, this conclusion also underscores the importance of ongoing evaluation and continuous development of this system.

In summary, the Framework for Academic Information Service Using AI Chatbots demonstrates significant potential for enhancing academic information services. Nonetheless, sustained efforts in development, improvement, and further research are necessary to optimize the utilization of this system in an evolving academic context.

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