Analysis of Student Performance in Using Chatbots for Guidance Reservations with Lecturers

Andhika Rafi Hananto[*1], Silvia Anggun Rahayu[2], Taqwa Hariguna[3]
[1,2,3]Amikom University Purwokerto, Indonesia
E-mail: [*1]**andhikarh90@gmail.com**, [2]silviaanggunr@gmail.com,
[3]taqwa@amikompurwokerto.ac.id

Abstract

Passive role proved to be an inefficient method in an information service. The use of technology in higher education helps to produce an effective, flexible and accurate information service where student and lecturer interaction activities make it the main actor in establishing good relationships in the lecture process. However, implementing an environment where students are active in establishing good interactions with lecturers requires a lot of effort considering the number of variables involved in this goal.To identify these variables, it is necessary to have an analysis of the data generated from students which aims to find patterns that allow them to be classified according to their needs. After these needs are identified, the next step is to make decisions that contribute to a process of interaction between students and lecturers; Therefore, the use of artificial intelligence needs to be considered. These techniques mimic human thought processes using structures that contain the knowledge and experience of human experts.

Keywords *— Artificial Intelligence, ChatBot, Student Satisfaction, Machine Learning*

1. INTRODUCTION

Today, the world of technology has progressed very rapidly. Almost every human activity cannot be separated from the role of technology. These technological advances support the birth of innovations in various fields, including educational institutions. Currently, most universities take advantage of the development of information system technology as a medium for delivering information and educational services. In higher education, it is necessary to have the best educational services to support the activities and performance of the academic community so that the academic community gets satisfaction with the services provided.To get satisfaction from a higher education service apart from the quality of education, universities must also provide consulting services and accurate information for the academic community. The use of a Chatbot-based consulting and information service information system by utilizing artificial intelligence (AI) technology is one of the facilities that can meet information needs, especially for students.

The college education environment strives to develop, improve the services and experiences of its members and students. This proves that currently universities are in the process of building a conducive environment with an interaction between the development of information system technology and the academic community, which aims to create an ecosystem of campus resources in order to meet the needs of the academic community. One of the main needs for a college is in the form of an efficient and accurate information service system that can facilitate the academic community.

To be able to realize the goal of an effort to improve an information service, the design of this chatbot is based on a generic architecture with a focus on data management. With this technology architecture, it provides special features for universities that are included in a layered architecture that includes data acquisition with an internet-based approach for matters related to the Internet of Things (IoT). The data generated from the interaction between the academic community were analyzed to gain knowledge and make decisions. However, the application of this technology has a certain level of difficulty because when talking about improving information services, this means that this Chatbot must provide accurate and efficient information services that can help the academic community, especially the interaction between students and lecturers. This chatbot has many benefits for providing accurate and efficient information services, among these benefits is an increase in good interaction between lecturers and students in making a meeting schedule and providing accurate and efficient information. With this, the purpose of this study is to analyze the results and efficiency of interaction between students and lecturers using and without the help of the chatbot that this study developed. For the analysis process, this study will use data mining in processing and analyzing the final results.

2. RESEARCH METHODOLOGY

In the development of this research, several concepts related to chatbot architecture were used. In this case, it is necessary to have knowledge related to these concepts and understand the various pillars of the chatbot. In addition, it is necessary to define the use of technologies such as AI and tools such as chatbots that can interact with the academic community and information services.

2.1. AMI

To define Amikom Message Intercom or known as AMI is a chatbot developed in this study, the chatbot itself needs to start from broader terms such as accurate and efficient information. In order for information to be accurate and efficient, a chatbot must have the ability to solve problems. Therefore, universities develop information systems technology with the aim of solving existing problems such as mobility, security, or service personalization. This requires a strong architecture to support data acquisition and analysis, cloud computing and decision making.

AMI makes IoT technology, Cloud Computing, data analytics and Artificial intelligence the basis of its operations. The technology becomes a pillar of AMI which is designed with the aim of later being able to identify the various needs of the academic community. However, in order to meet the needs of the academic community, universities must do so in a sustainable environment with nature. Each of these components goes into action and focuses on this particular task in order to achieve an existing goal. IOT through the existence of a sensor and actuator system interacts with the academic community without requiring the role of humans or computers. There is an interaction that occurs between devices and humans which in this case is the process of sending cloud data that occurs and the processes that occur so as to produce a response or develop an action.

2.2. Chatbot

Chatbot is a computer program that can be regarded as a conversation assistant that can interact with users using a language-based interface. Therefore, the main purpose of the chatbot itself is to intelligently simulate the existence of a human conversation so that the other person has an experience that is as close as possible to a conversation with another person.

Chatbots provide accurate and clear information with several actions offered by chatbots such as providing information about a product, event or taking an action. The general function of a chatbot is to start with the use of natural language. However, even so the conversations that occur in the chatbot are based on a defined flow of conversations, based on a structured interaction which results in some ambiguity of meaning.

On the chatbot itself the existing conversation bot is based on a decision tree or in other words driven by artificial intelligence. In addition, the chatbot interface used is based on human conversations that have been obtained through Natural Language Processing (NLP). With the use of NLP it can enable algorithms to understand, interpret and manipulate human language. But not only that, chatbots that have been developed into a more sophisticated system can learn from a conversation by applying Machine or Deep Learning. Chatbots, to be able to have conversations with users, must have the following components:

1) Chatbot is an artificial intelligence tool for conversation. With this Chatbot, it is possible to manage and process natural language. Through Artificial intelligence (AI) chatbots have the ability to analyze user entries, thereby producing a response that is in accordance with the input entered.
2) Based on the user's experience as a UX user, the UX's duties and responsibilities are to make a conversation between users as natural and intelligent as possible.
3) The user interface (UI) is a component in which there is interaction between the user and the chatbot, namely by the presence of elements that can be seen and heard by the user physically with the aim of being able to make decisions and follow the conversation.
4) Conversational design is a design language based on human conversation. This conversational design is responsible for providing human logic for artificial intelligence.

To be able to make a chatbot and users connect with each other, it is necessary to have a good algorithm design, namely AI, UX, UI, and conversation design must be related to each other correctly. In addition, the algorithm when implemented with AI must be able to interpret user input or user input in a conversation and decide what to answer. This capability is generated by the presence of AI intelligence in processing systems, understanding and natural language technology. Based on the complexity, chatbots are divided into two, namely structured chatbots or said to be the first generation that bases its operations on a set of rules and the second is the second generation chatbots that use machine learning, artificial intelligence, or other machine learning mechanisms to interact with users.

Currently, the need for information services makes chatbot tools very useful and useful, especially in the world of education. In the world of education, reflection is needed in the incorporation of chatbots in the world of education, this is to determine what the goals are in education. Therefore, there is a need for an institutional and organizational discussion or

debate to ensure the functionality, viability and scalability of the institution. Even though there is a chatbot that can work quickly and precisely, this cannot replace the figure or role of teachers or staff, especially administrative staff and information services, but only replaces some of the tasks carried out by these figures to complement and assist them.

With the presence of UI, chatbots can be present in student interactions, information and content. These advantages make them mediators of these interactions in the online learning environment. With this UI, chatbots base their UI on a menu and button which allows people and engines to connect with search keywords. With this chatbot with UI, various things needed by students and lecturers can be requested through easy consultation using natural language. Thanks to this, chatbots can be configured as a new UI/UX by enabling, facilitating and accelerating access to existing information.

For example, if a student is going to conduct a guidance or consultation, students can easily contact the lecturer or access information that is not available in the LMS regarding conversation services with lecturers. With this chatbot, you can complete or schedule a meeting for consultation quickly and easily. For lecturers and learning managers, it is possible to use this chatbot as a tracking engine for your student's evolution or use it as a resource to support learning. In addition, the main advantages of chatbots are that they do not take up too many computing resources, the user experience becomes more enjoyable, and the interaction increases interest in the subject.

With this chatbot, it is possible that chatbots will also depend on the number and type of interactions they have with chatbots or other tools. Therefore, in this way the functionality of the chatbot with other tools is combined into a single data that allows for an integrated action to be executed. An example is the ability of a chatbot to collect information related to lecturer data in the form of contacts that can be contacted which is then combined with the available features of campus information services available on the campus website to reconcile data and confirm the existence of guidance between students and lecturers.

2.3. The role of chatbots in education

As already stated, chatbots can be developed through social media platforms specifically for communication. There have been several previous studies that can be used as a reference in supporting this research, including: Santoso (2011) conducted research on the design of a web-based customer service system chatbot prototype. The research shows that the chatbot is successful in responding to all customer consultations quickly, according to what has been represented in the database. Likewise, research conducted by Setiaji et al. (2013) with the title "Building an AIML-Based Chatbot with a Modular Knowledge Architecture" is also described. The research shows that the built chatbot produces services that can be used for conversations with users using natural language intermediaries. Research by Wijaya et al. (2019), with the title "Building a Web-Based Chatbot Application on CV." Unomax Indonesia gives results that show the chatbot application can run well and answer every question quickly as expected. Another research related to campus services to students was carried out by Ramdani (2018) with the title: Development of a LINE Bot-Based Mail Management Service Application. The results of this study indicate that LINE, which is enabled by using the

internet network, can perform activities such as sending text messages, sending pictures, videos, voice messages, and others. Students' chatbots in LINE Messenger instant messages are able to provide services to students related to requests for processing letters at the Informatics Engineering Study Program, Pasundan University. A similar study was conducted by Cucus et al. (2019) with the title: Chatter Bot for Academic Consulting in Colleges. This chatbot is designed to be able to assist students in conducting academic consulting activities so that they become more effective. Research by Guntoro et al. (2020) with the title "Chatbot Application for Campus Information and Academic Services Based on Artificial Intelligence Markup Language (AIML). The research shows that the chatbot application can run well and is able to answer the questions asked according to the knowledge that has been previously given. The knowledge provided in this chatbot application is the following: the campus address, registration requirements, registration steps, study program, coursework, how much is the tuition fee, and how to register. Other research related to university services to students was carried out by Zubaidi and Ramdani (2019), namely the development of a Telegram-based chatbot that provides various services such as providing information, final project services, field work practice services, and writing at the Informatics Engineering Study Program, University of Mataram.

Based on the results of previous research, it can be concluded that the chatbot application is able to replace the human role as customer service, who is ready to provide services 24 hours a day efficiently, accurately, and flexibly. Besides that, the chatbot application can minimize difficulties in finding information related to lecturer contacts used in communicating via online to create a guidance schedule. Through chatbot applications in the world of education, there are many benefits and advantages, especially related to service satisfaction and the efficiency and effectiveness of information service activities. Colleges or universities, as institutions that play a role in providing services to the community, especially students, have partially developed chatbot applications even though the types of services and the number of universities are still limited. Colleges or universities generally provide services that are still conventional in nature, where students who need services or information must come to campus themselves or use unidirectional services through the website. So far, services through the chatbot website are still very limited, so that academic services are felt to be slow and less flexible. Therefore, it is necessary to conduct research on the development of chatbot websites in order to improve information services in universities.

3. METHODOLOGY

To improve an information service in the world of education, it is necessary to have AI modeling that is in accordance with the chatbot infrastructure. There are several important layers to being able to place individual events into AI operations. Like the campus architecture layer shown in Figure.1. The first layer is responsible for data acquisition that prioritizes IoT devices. Some of these devices interact directly with the campus community, which have been divided into three groups to do their respective segmentation. In the first group are those who are responsible for all management of information services, the second group consists of lecturers and students, the third group and the most emphasis on this work is student activity. With the existence of IoT devices, the various needs of each group and important information related to the activities they carry out can adapt to each other. For example, different IoT

devices and sensor systems obtain information from students. Performing and classifying it This information is important at a time when AI has to draw conclusions about some of the events it analyzes.

The second layer is a computing process using public or private clouds. In this second layer, the task of the AMI architecture is to store data in several sources in the database or it can also be done by sending data to the cloud so that later it can perform certain types of processing, such as in the field of security access to restricted areas such as facial recognition, so it becomes an AI algorithm. using a cloud like Microsoft Azure or Amazon.

The third layer contains data analysis. To be able to carry out a data analysis process, it is necessary to have Hadoop as a big data framework. The third layer is the most important layer because in the process it is responsible for analyzing all data, both structured and unstructured in the cloud or local storage. The data processed by Hadoop is processed to provide information that is sent to the AI integrated into the chatbot. In the process, the chatbot contains quality, fast and accurate information. The chatbot knows various lecturers' information through Hadoop, because this information is of high quality and ensures that the data is real and verified on student tendencies, as well as the progress presented by students in every interaction. With this method, the Chatbot is able to integrate data analysis carried out at this layer into its analysis and has information obtained directly from interactions with users.

Furthermore, the knowledge layer is responsible for exploiting all knowledge and will later be displayed on the dashboard or control panel and applications used by students. In LMS users, students can communicate chatbot data, through identification of the user or users and start interacting with the use of several questions and the natural language used.

In its application, a system that is relevant for students is needed. AMI has several systems that can serve students. This service can be accessed by the entire campus community wherever they are. The goal is that the entire campus community, especially students, can use chatbots flexibly wherever they are.

Campus information services can be accessed by the entire academic community who will seek various campus academic information. so that this is intended to implement a chatbot in an academic platform which can later be used by the academic community in accessing information services, especially lecturer data and lecturer guidance schedules, therefore chatbot is the most appropriate system to be developed in this case.

Chatbots generally have a strong LMS where students have available resources and can carry out their interactions or activities on the services that have been provided. Chatbot, apart from a simple repository, has become a true assistant for lecturers and students.

3.1. Variable Identification

In identifying variables, all tools and systems owned by AMI to obtain information play a role in the process of collecting and grouping data. In some campuses that have not implemented information technology systems, matters relating to student performance are

measured based on academic records, but this is not sufficient to meet the possibility to increase the number of variables that can affect the performance of student activityFor example, in the AMI information service it is possible to identify the most interesting and trending aspects of each member.

Not only IoT but there are several traditional computer systems that can store information into a traditional database. Like an LMS which functions in the repository and is the main assistant in a development activity and review of resources. In addition, this LMS is also tasked with helping identify variables that are tied to the autonomous work carried out by each student. not only that LMs can measure student performance in an online mode if the AMI offerings are regulated in such a way.

To be able to recommend the possibility to identify with greater granularity the problems presented, activities that are aligned with each student required a more effective AI modeling. Another way that can be used to identify a dependent variable with academic performance is the AI model through the implemented chatbot. Unlike other AI modeling, this chatbot will continue to interact with the academic community to obtain information. So that in designing this chatbot the developer not only recommends but tries to learn from each user's needs by identifying their needs directly.

3.2. Chatbot Integrated Architecture - AMI

Chatbot integration into the smart campus architecture enables automated decision making, and also provides support and monitoring of student activity. So there is a need for a process to determine how AI adapts to architectures that handle other technologies and that enable the management of large volumes of data. As in Fig. 4 there is a diagram which can respond to the AMI architecture to connect to the Chatbot phase using AI. This is where an integration is developed in a smart environment that can manage an architecture based on data management. To be able to do that process it has a bear dataframe that was already mentioned. Each Chatbot component adapts and uses the infrastructure already in use in the Chatbot AMI.

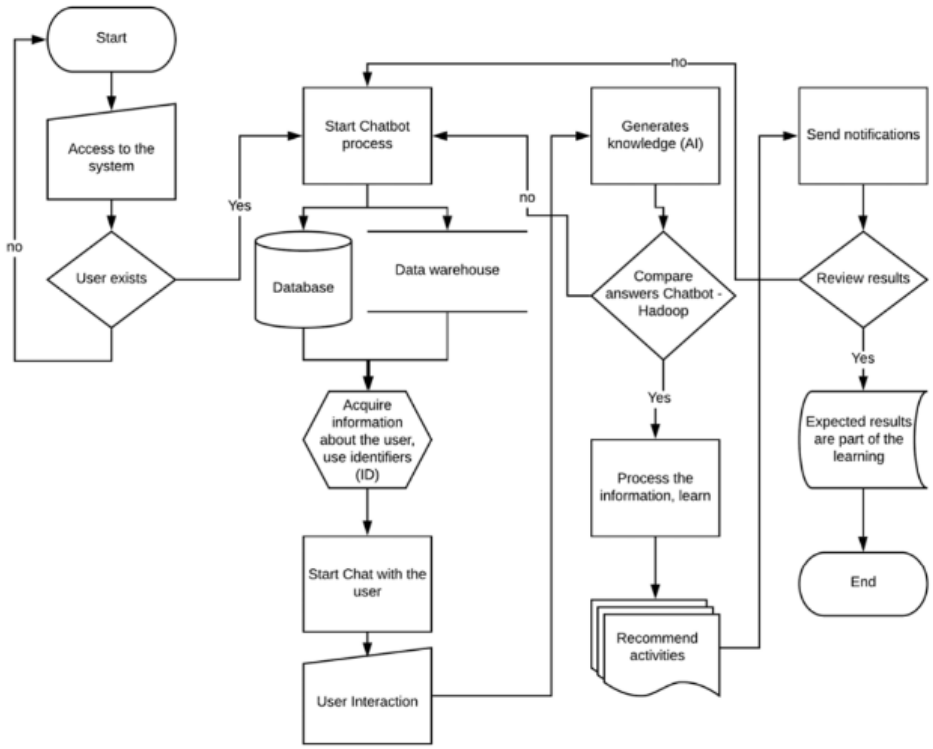

Figure 1. Chatbot integration operation diagram.

After the existing information will interact directly with users by making a question and answer related to information services. AI will interact directly using natural language and the answers obtained and then compare them with information that it does not know. This is a process in which the AI system works by detecting the correctness of the responses and to improve their learning. The chatbot processes the information available to each student taking into account the results obtained by Hadoop and the conclusions reached by interactions with users. So that it allows users to know the quality of each student and student activities according to the characteristics and needs of each student. However, if there is an interaction with the user but the Hadoop data obtained does not match then the AI module will return to the initial process so that later it will look for other information in the data repository and will ask the user a new question to adjust the weights so that it can achieve satisfactory results. conclusion.

Based on the analysis that has been done, the Chatbot recommends activities that have the greatest weight and notifies lecturers and students by starting the evaluation stage. At this stage, there is a comparison of the qualifications that have been obtained with the results responding to the management of the rubric with a history of activities. If the rubric criteria have been reviewed, the results will be saved to be used as success stories for cases marked by the same pattern and the process ends. However, if the results obtained are inadequate, the Chatbot will restart the process to find more detailed information and feed the system until the rubric criteria are met.

Information management complies with AMI internal guidelines as well as Ecuadorian policies and laws, this is the country where the college work is done. SAll processes and

management have been defined in the AMI architecture which is in charge of managing information. However reference can be made to the fact that the data will be processed through the policies and processes generated by the AMI Information Services Ethics Department. In this case the data does not contain user information and identifiers that are used according to this analysis to hide user privacy. In interaction with users, Chatbots are forced to bring personalized services that use everyone's first name. These names are stored in a temporary variable which deletes the user information at the end of the session.

3.3. Data Analysis

Customary analysis is important in identifying the ease with which students can access information services. Achieving this goal requires a tool capable of extracting data from all kinds of sources, then converting it and uploading it to the next stage of AI modeling for educational personalization. There are several tools that can be used for this. There are several profitable platforms for data analysis. The use of BI is applied to academic data analysis and the second option is the use of big data architecture.

The advantage of implementing BI which focuses on academic data analysis is that the technology is widely used in the industry and the results are well proven. Although the use of BI has its own complexities, it is easy to overcome because of the large amount of information available. The technology they use can be either a commercial license or an open type and technical support is available in both cases. However, there are some weaknesses, such as BI has limitations in large data volumes which result in penalties in processing

Another solution to the weakness and complexity of BI is to use a big data architecture that handles large volumes of data very well and delivers unrivaled improvements in processing. this makes BI an advantage or disadvantage in analyzing data regardless of the format in which they are located. In addition, big data is considered a new technology because of its analytical capabilities that can be applied in large environments or in processes that generate large volumes of data. These characteristics are reduced by the complexity of its implementation and by the high need for knowledge that must be possessed by the people responsible for its implementation.

This research focuses on the use of big data architecture for data analysis and management. This allows us in this study to focus on the design and functionality of the artificial intelligence model knowing that the data analysis process has been adequately tested on AMI information services.

3.4. Chatbot Model with Artificial Intelligence

The AI model for recommending activities should be tailored to the defined needs to improve information services. There are some of the most common AI models such as expert systems, recognition systems, behavior-based intelligence, etc. Ideally it should focus on the type of model that fits the student's needs and interactions that contribute to student motivation. One of the tools that greatly improves handling and interaction with users is the Chatbot. Because chatbots consist of computer programs that make it possible to carry on a

conversation. This capability makes it possible to request certain types of information or to perform an action. Therefore, they have the possibility to study user preferences over time.

However, aligning and modifying Chatbots to increase the efficiency of student tutoring depends on several parameters such as knowledge of the variables and the infrastructure in which they are implemented. Figure 5 contains the architecture of this model plus the results obtained from data analysis of students and lecturers. The architectural phases start from the user's interaction with the system, and this interaction uses a channel which in this case is done through chat via the chatbot website.

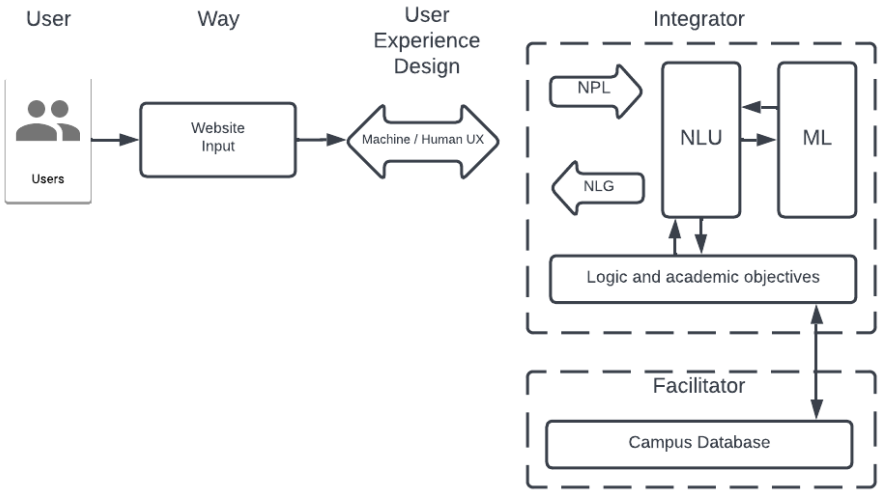

Figure 2. Communication architecture between chatbots

The next module is the integrator which is a key part of the Chatbot by providing all the Natural Language Processing (NLP) tools. In this process NLP is responsible for the processes carried out by machines to acquire, identify and process natural language, after processing it is forwarded to another process known as Natural-language understanding (NLU). Next, the NLU will identify the user's intention or input entered by the user. NLU itself is a process that goes hand in hand with Machine Learning (ML). The chatbot integrates predefined AI rules then the chatbot will integrate the neural networks that allow this to learn, and this implies that the Chatbot needs to be trained to suggest activities that meet student needs.

The facilitator module contains all the data that has been done in the form of data analysis, external systems and additional databases which are used for student identification and in this facilitator information services communicate logically with the system in this case. For example, a student starting his session on an LMS has an activity log that you need to keep an eye on, and this is where the Chatbot comes into play. When the Chatbot starts, there is interaction or input made by the user such as greetings so that automatically communicating or conversations between users and the Chatbot can run, besides that in the second phase the Chatbot has information about activities that are performing poorly.

The data obtained is the result of analyzing the data contained in the facilitator. With this information the Chatbot will start a second interaction with students. The purpose of this is

to find reasons related to the failures that occurred in the process of developing these activities, both NLP and NLU in operating and interpreting student situations. By integrating the module, it concludes what students need and recommends certain types of activities from the catalog stored in the chatbot.

In Figure 6. It is explained related to the process in operating the Chatbot and each phase using a flow chart. Students can access the LMS and start a conversation with the Chatbot using initial greetings. So the Chatbot will process and analyze the information that has been generated from the interaction. In addition, the data that has been obtained from the big data framework will be added to the analysis. After going through the analysis stage, the AI module will verify the fulfillment of the predetermined schedule to conduct guidance with lecturers. The analysis is carried out in two stages, the first stage is responsible for reviewing the interaction of input from students. Furthermore, the second stage is the process of analyzing the performance of student interaction activities with lecturers in relation to the activity of determining the guidance schedule. Each activity qualification responds to a rubric that always evaluates the scope of the evaluation criteria for conversations or interactions that occur. Once you have this information, a notification is scheduled on the student calendar and the Chatbot notifies the student in natural language about anything pending and ends the session.

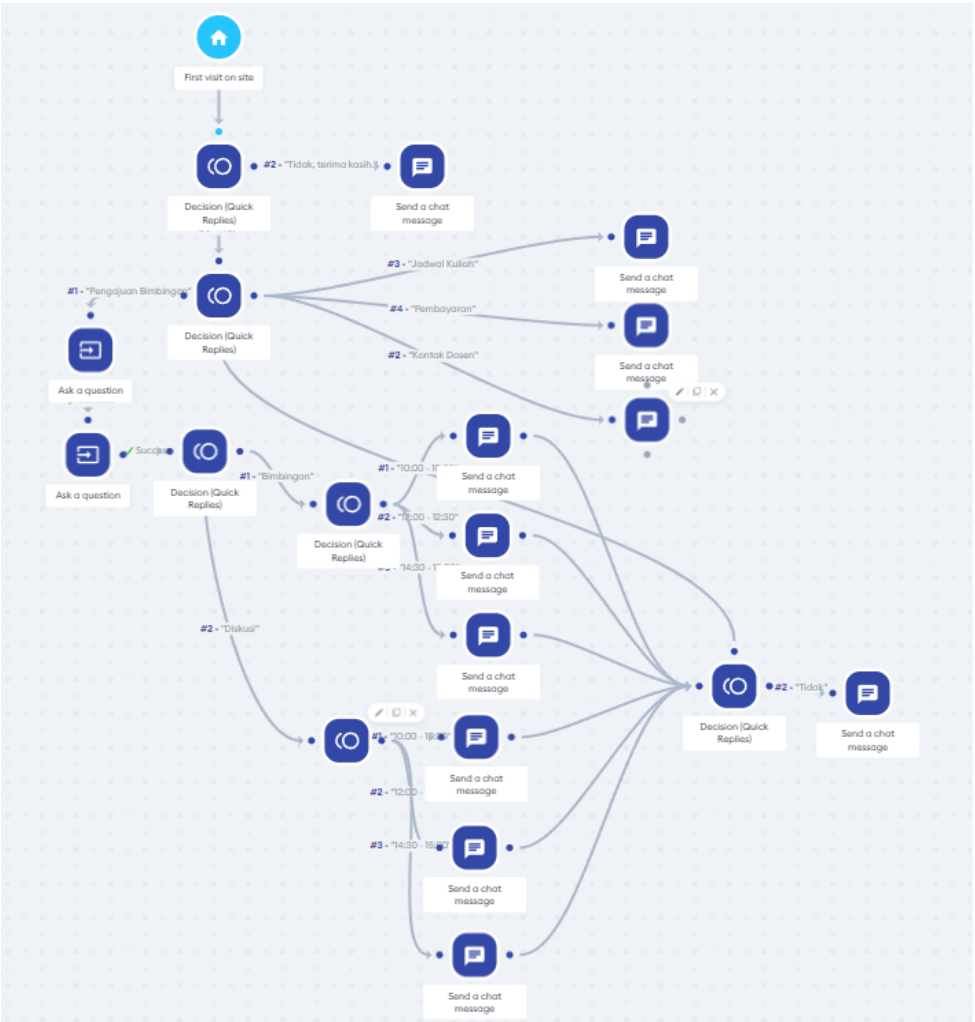

Figure 3. Chatbot behavior for activity recommendations.

If there is a desire or user input that has not been met in the evaluation criteria to produce quality interactions, the Chatbot will start the process to identify appropriate activities where students indicate the causes of low performance and which are underperforming. If the problem is identified, the next step for the AI module will be to review student history through the use of the data it manages and engage in new interactions with lecturers. With this new interaction, the Chatbot seeks to clarify what problems are causing students difficulties in communicating or scheduling tutoring with lecturers. This process is carried out through questions about the guidance flow and offers students several alternatives based on the available recommendations. The chatbot comes to a conclusion with this new information and reviews in its catalog all interactions that align with the needs and patterns detected in the student. This pattern analysis is a phase developed in this chatbot architecture. With this information, the Chatbot recommends the interaction to students and once it is developed and qualified, the AI module enters the results evaluation stage. The purpose of this phase is to determine whether the development of this activity is in line with the needs of students. If the evaluation has a satisfactory result and the student interaction activity is verified, the Chatbot generates knowledge of the case, notifies the student and ends the process. If the Chatbot detects that the desired interaction was not achieved, the process returns to activity identification and the process is repeatedly discarding the first activity and recommending the next activity.

4. RESULT

In this study, in the chatbot implementation process, it opens up opportunities for the creation of a pedagogical model in which an effective interaction grows from students and lecturers to discuss or reflect on their respective roles according to what has been recorded in the chatbot. In addition, it allows capturing conversations with users to carry out cognitive and affective analysis or exploration of student and lecturer perceptions about certain topics, interactions, situations or contexts. When analyzing the results of the Chatbot implementation in the LMS of universities participating in this study, the students showed a significant improvement in the existence of an interaction and good relationship with lecturers as in the following aspects.

4.1. Participation in Mentoring

In this study, create two groups of students consisting of 50 students each with the aim of developing and testing chatbot performance. Based on the data obtained, approximately 75% of students showed greater interest in the use of chatbots at a test duration of more than 30 days, this is an interesting result. After the results are collected, the data will be visualized in the LMS chatbot so that researchers can see the results from the data clearly. Students through Chatbot have access to lecturer contacts, such as the lecturer contact service provided by the AMI chatbot system. The use of this information service allows students to interact with lecturers through online media in making a guidance schedule or meeting schedule. In addition, Table 2 shows the problems detected through Chatbot interactions with students and considered to be the cause of students' lack of interest in developing activities. For this exercise, four common problems have been identified in the information services model managed by AMI. The data is obtained through chatbot interactions by asking questions in the

form of a survey conducted to each student of the study program. For this the students have been divided into groups 1 and 2. The role of this test is to group common problems into several categories namely high, medium and low. This is quite important so that we can see the real impact of chatbots to overcome this problem.

Table 1. Problems identified in the traditional teaching model through the use of chatbots.

Identified problems	Group 1 - 50 students	Group 2 - 50 students
Inconsistency of available time	High	Low
Difficulty finding contacts	Low	Low
There is a miscommunication	High	Low
Lack of available time	Low	Low

The results of this survey are explained as follows. For group 1, the problem occurred when the AMI chatbot was not available where the accuracy showed that the problems that occurred were quite high, especially those related to the consistency of time available from the lecturers to provide student guidance services. For group 2, there was a decrease in the accuracy of the problems that occurred, which was due to the use of the AMI chatbot by the academic community to carry out the interaction process in the form of conversations in determining the guidance schedule. With the implementation of the chatbot we can draw a little conclusion that the AM . chabot.With the implementation of the chatbot, we can conclude that the AMI chabot has succeeded in providing the role of facilities that can help students improve the performance of their activities on campus. This also does not rule out the possibility that a more advanced and effective educational model will be created, as well as acting as a positive activity for students.

4.2. Monitoring in the Development of Academic Activities

The sample data analyzed in the first 90 days after the implementation of the Chatbot showed relevant changes in student performance. Table 3 shows the activity data of AMI chatbot users in providing an information service that is accurate and efficient in development versus the appropriate time period. The agreed duration of testing in this study is three months, with the aim of seeing in full time the impact of the chatbot implementation on the student project process which is generally carried out for two to three months.

Table 2. Student productivity with and without using Chatbot.

Activity	No Chatbot	30 Days	60 Days	90 Days
Make a tutoring schedule	60%	85%	88%	90%
Implementation of guidance	65%	83%	88%	94%
The process of implementing the results of guidance	78%	83%	89%	91%
re-guidance	65%	30%	22%	9%

In all cases that arise in connection with the implementation of guidance carried out by students, there is an increase in the evolution of achievement towards the better in students. This is the result of the AI implemented in the chatbot. After knowing beforehand that the guidance process for each student and what steps each student must take in making a guidance schedule with the lecturer. In a focused manner, the performance and effectiveness of interactions between students and lecturers are assessed. However, the assessment is still carried out by manual processing from researchers because students do not have adequate parameter evaluations. That's why we developed a feature where the chatbot can be used as an assistant during interactions such as uploading files and taking notes. Then after the interaction takes place, the chatbot will ask for an assessment from both parties (students and lecturers) regarding the chatbot's performance and each other. With evaluation data that continues to be collected every time there is an interaction, it can provide a solution to the unsolved analysis of the performance and effectiveness of the interaction..

4.3. Recommended Activities

All data stored in the chatbot database will be processed both for study analysis purposes and for the needs of the lecturers themselves. There are drawbacks that the chatbot itself has not been able to solve, namely the data collected is always lacking for new analyzes that have not been implemented, for example, the chatbot has not been able to accurately predict student follow-up activities in each new session with the lecturer. In order to solve this problem the chatbot collects data interactively from the students themselves on several points randomly with quotes still in topic and the interaction cycle in general, this allows the chatbot to always perform new analyzes that can see data that is not yet visible. In Figure 7 it is observed the stages that make up the activity recommendations, each stage depends on the previous stage and all of them work in relation to student data analysis. The system in the chatbot is responsible for the service of information collected from main sources such as databases, internal and external data.

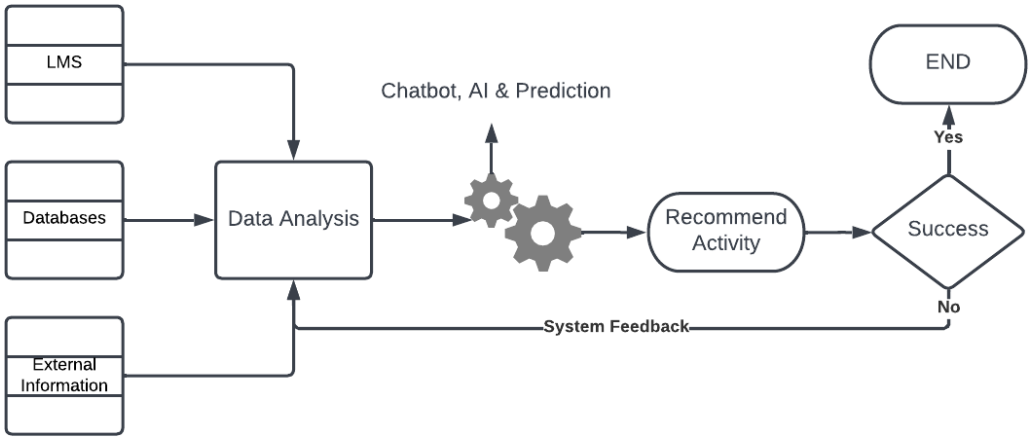

Figure 4. Stages for activity recommendations using a Chatbot that integrates artificial intelligence.

In the data analysis stage, in the analysis of interaction activities between students and lecturers, this becomes the backbone of the research because it has a very high role in the results of research where the data that has been collected will be analyzed for its performance at this stage. The recommendation system itself is flexible or generic in which various technology models can be combined in the processing of this system. The less active interaction of students will be determined by factors and percentages in the analysis process. For example, a problem that generally occurs is the inconsistency of time and contacts which are difficult for lecturers to find. By debugging the data and a selection process that allows the data to be evaluated properly so that it can see well the cause and effect of each problem.

Data mining algorithms are able to aggregate anomaly variables by searching for them and then make decisions based on the findings. Data that has already been processed and data mining algorithms may be used to find trends in students. For instance, it is feasible to find students who are less engaged in forming positive relationships with lecturers to have discussions or get advice. This example demonstrates what is now possible, while being quite basic and omitting any mention of the enormous possibilities of data mining. Additionally, it is feasible to combine algorithms to enhance the system's granularity and evaluation of outcomes. A cluster method is frequently used in analyzes to be able to handle material that is provided to many students in a similar way. If we go back to the first example, we may create different groups where students who had similar traits were found when the suggested activity or assignment was being developed. Multiple tasks that adapt to the cluster might be proposed in this way, enhancing management's ability to make decisions.

The second phase is the AI component, which builds on the information gained through student data analysis. In order to accomplish this, the chatbot maintains a neural network-based model that enables it to learn from users. The Chatbot can link this knowledge to that gleaned from their conversations and augment it to make stronger judgments thanks to student data that makes the process easier. Students who enter the chatbot are immediately given these recommendations. This suggestion is based on information on student performance in all interactions with professors. These recommendations can also be sent to students' devices by email or text message, as well as through notifications included into the LMS interface.

The AI method includes a series of inquiries to confirm that the user is who they claim to be before suggesting activities based on the information learned from interaction with other students. Once the user's identity has been established, the chatbot moves on to stage two, where it aims to discover the requirements and strengths of the pupils and gain knowledge from their replies. For a better comprehension of the activities that are most suitable for pupils, two methods of activity recommendation come together. In the final step, the system checks to see if the student has improved; this check depends on the certifications obtained from the activity, compliance checks, and the effectiveness evaluation % at each post. The system terminates the procedure once the desired learning percentage is reached. If it doesn't, feedback is given before moving on to the data analysis step of the process. The data will now be evaluated, and fresh data that supports the findings will either be removed or added.

5. DISCUSSION

This research suggests an architecture that unifies a number of systems in charge of duties that the field of education, particularly in the area of technology solutions, urgently needs. These jobs include everything from data analysis to integrating AI into chatbot environments. By integrating all processes in a cycle where information services are focused on student demands, architecture with these qualities enables an improvement in a better direction in relation to activities involving student and lecturer contact. In those other studies, each phase is referred to as a distinct instrument that advances student engagement. However, the advantages of the suggested design make it possible to collect and analyze information regarding student performance from a variety of sources. With the help of the Extract Transform Load (ETL) procedure, which enables the establishment of connection strings with various databases, data analysis systems may be integrated into the architecture.

By ensuring high-quality data for the analysis, this method increases the dependability of the subsequent stage. The strengths and shortcomings of student engagement activities with lecturers are assessed using patterns found in the clean data that are then examined by various data mining methods.

These findings are transmitted to the AI system after the deficiencies of each learner have been identified. In contrast to data mining techniques used in formal schooling, decision-making and action are always dependent on the person in charge of information services. This is a flaw in the process since, regardless of how thorough the prior study, the decision is ultimately up to the individual. Any action that has an impact must be performed instantly, which is another drawback. Due to the large number of university students, this individual procedure cannot be completed. The suggested system makes a substantial contribution to this process by including an AI module that permits instantaneous decision-making. The module contains data that was discovered through data analysis and user interactions with the chatbot.

The incorporation of artificial AI models into information services and new technological models is frequently seen as an encroachment on the educational realm by the technical community. However, the issues brought on by the development of educational models must be resolved using current technologies. For instance, the shift from face-to-face to online education is a current trend in education. IT professionals must be included in these

models as ideal lecturers' and academics' assistants, of course. Typically, in the online approach, professors and students don't directly know one another. To build positive contacts and relationships between professors, students must take a more active role in the setting where there is interaction in the cold model. By developing a tool like the one suggested in this study, any educational paradigm may be adapted, allowing student engagement to evolve at any moment without being constrained by a person's inherent limitations. Additionally, by being aware of every need a kid has, teachers may utilize their historical perspective to provide more effective answers.

6. CONCLUSION

Existing educational models must inevitably be merged with new technology, and new models should be built around these new technologies. When designed with generic models in mind, this system aims to use face-to-face, partially-attendance, or online learning models. By letting the AI module learn from each contact with the user and alter its weights, this technology aids in student follow-up by enhancing natural language comprehension and conclusions drawn.

A current engagement activity may be significantly improved by including a comprehensive system that incorporates data analysis, AI decision making, and activity suggestions in the chatbot environment. Students can gain more knowledge about trends, strengths, and shortcomings thanks to the implementation of a data analysis platform that processes academic data. The system may, for example, become a perfect teaching assistant and even more so in the creation of information services inside universities since the scope of this activity is entirely expandable, which means the system permits the inclusion of other players in the field of information services.

Making decisions is one of our strongest skills and has the biggest impacts, both in the academic setting and in business. However, because learning demands a bigger value, this must be done successfully and quickly at the appropriate moment. Additionally, whether or not pupils succeed academically also depends on this.

The closest thing to controlling tutors around-the-clock is to entrust this job to the AI module. It is in charge of keeping students informed about all relevant events, and it also ensures that they have opportunities to connect with professors, which increases their interest in the topic and allows AI to suggest improvements to the information service.

The Chatbot's integration of the AI model responds to student demands. Several research that represent the study of information theory include needs in their analyses. According to these beliefs, information services are to blame for identifying the common issues that students run into when developing their academic activities. activities that provide advice by reacting to factors and patterns detected in student group data. This does not, however, imply that using this characteristic to evaluate individuals individually is not possible. Models like AI may be used to customize an encounter by doing individual evaluation and identifying any deficiencies.

7. REFERENCES

[1] C. Koornhof and D. du Plessis, "Red flagging as an indicator of financial statement fraud: The perspective of investors and lenders," Meditari Account. Res., vol. 8, no. 1, pp. 69–93, 2000, doi: 10.1108/10222529200000005.

[2] A. Y. Chandra, D. Kurniawan, and R. Musa, "Perancangan Chatbot Menggunakan Dialogflow Natural Language Processing (Studi Kasus: Sistem Pemesanan pada Coffee Shop)," J. MEDIA Inform. BUDIDARMA, vol. 4, no. 1, pp. 208–215, 2020, doi: 10.30865/mib.v4i1.1505.

[3] Maskur, "Perancangan CHATBOT Pusat Informasi Mahasiswa Menggunakan AIML Sebagai Virtual Assistant Berbasis Web," KINETIK, vol. 1, no. 3, pp. 123–128, 2016.

[4] J. P. Jumri, "Perancangan Sistem Monitoring Konsultasi Bimbingan Akademik Mahasiswa dengan Notifikasi Realtime Berbasis SMS Gateway," Inform. Terap. , vol. 1, no. 1, 2018.

[5] N. C. H. Wibowo, F. I. Milenia, and F. H. Azmi, "Rancang Bangun Bimbingan Konseling Online," Walisongo J. Inf. Technol., vol. 1, no. 1, pp. 13–24, 2019, doi: 10.21580/wjit.2019.1.1.3924.

[6] H. Mayatopani, W. T. Atmojo, and E. Dazki, "Peran Ketua RT Dalam Edukasi Warga Melalui Transformasi Digital Pandemi Covid-19 Menggunakan Chatbot," KOCENIN Ser. Konf., vol. 13, no. 1, 2020, [Online]. Available: http://www.covid19.go.id.

[7] M. A. Manuhutu and J. Wattimena, "Perancangan Sistem Informasi Konsultasi Akademik Berbasis Website," J. Sist. Inf. BISNIS, vol. 9, no. 2, p. 149, 2019, doi: 10.21456/vol9iss2pp149-156.

[8] M. Hikmatyar and Y. Sumaryana, "Pengembangan Sistem Informasi Layanan Bimbingan Akademik Mahasiswa," Informatics Digit. Expert, vol. 1, no. 1, pp. 32–36, 2019, [Online]. Available: http://index.unper.ac.id.

[9] R. N. Astuti and D. M. Fatchan, "Perancangan Aplikasi Teknologi Chatbot Untuk Industri Komersial 4.0," Pros. Semin. Nas. Teknol. dan Sains, vol. 5, no. 10, 2019.

[10] D. V. Rahayu, "Pengembangan Sistem Bimbingan Tesis Berbasis Web," JAS-PT (Jurnal Anal. Sist. Pendidik. Tinggi Indones., vol. 4, no. 1, pp. 57–66, 2020, doi: 10.36339/jaspt.v4i1.291.

[11] W. Kurniawan, A. Suprianto, and B. Sumardiyono, "Rancangan Sistem Forum Diskusi Online Untuk Program Studi Sistem Informasi Antara Dosen Dan Mahasiswa," J. Rekayasa Inf., vol. 5, no. 2, 2016.

[12] T. Sugiharto, "Rancang Bangun Sistem Informasi Pengelolaan Bimbingan Mahasiswa dengan Dosen Pembimbing Akademik Berbasis Web," J. Tek. Inform., 2018.

[13] A. L. Maitri and J. Sutopo, "Rancang Bangun Chatbot Sebagai Pusat Informasi Lembaga Kursus dan Pelatihan Menggunakan Pendekatan Natural Language Processing," Teknol. Inf. Elektro, 2017.

[14] A. D. R, F. Imamah, Y. M. Andre, and Ardiansyah, "Aplikasi Chatbot (Milki Bot) Yang Terintegrasi dengan Web CMS untuk Customer Service pada UKM Minsu," J. Cendikia , vol. 16, no. 1, 2018, [Online]. Available: http://www.infodanpengertian.com/pengertian-.

[15] H. Kurniawan, M. Al Fazar, N. R. Fauziah, Yoan, and I. R. Munthe, "Whatsapp Chatbot Implementation for New Students University of Labuhanbatu," J. Mantik, vol. 5, no. 2, pp. 932–939, 2021.

[16] M. Hikmatyar and A. Sudiarjo, "Sistem Informasi Layanan Bimbingan Akademik Mahasiswa Berbasis Android," J. ICT Inf. Commun. Technol., vol. 20, no. 1, pp. 165–172, 2021.
[17] D. Suryani and E. L. Amalia, "Aplikasi Chatbot Objek Wisata Jawa Timur Berbasis AIML," SMARTICS, vol. 3, no. 2, 2017.
[18] F. Rini and F. Purnama, "Bimbingan Skripsi Online berbasis Web Pada Program Studi Sistem Informasi STMIK Nurdin Hamzah," Semin. Nas. APTIKOM, 2019.
[19] A. R. Novaliyan et al., "Bimbingan dan Konseling Mahasiswa yang Berbasis Sistem Pakar dengan Menggunakan Metode Faktor Kepastian," J. Eng. Technol. Appl. Sci., vol. 3, no. 2, pp. 21–34, 2021, doi: 10.36079/lamintang.jetas-0302.234.
[20] Muliyono, "Identifikasi Chatbot dalam Meningkatkan Pelayanan Online Menggunakan Metode Natural Language Processing," J. Inform. Ekon. Bisnis, vol. 3, no. 4, pp. 142–147, 2021, doi: 10.37034/infeb.v3i4.102.
[21] E. Yuniar and H. Purnomo, "Implementasi Chatbot 'ALITTA' Asisten Virtual dari Balittas Sebagai Pusat Informasi di Balittas," J. Ilm. Tek. Inform., vol. 12, no. 1, pp. 24–35, 2019.
[22] A. Zubaidi, A. Z. Mardiansyah, W. Wedashwara, and A. H. Jatmika, "Integrasi Sistem Informasi Akademik Dan Bot Telegram Sebagai Media Pengaksesan Informasi Di Universitas Mataram," JTIKA, vol. 3, no. 2, 2021, [Online]. Available: http://jtika.if.unram.ac.id/index.php/JTIKA/.
[23] A. P. Nugroho and D. Kusumaningsih, "Metode Collaborative Filtering Dalam Penampilan Rekomendasi Produk Dalam Aplikasi Chatbot Dan Mesin Rekomendasi Berbasis Web : Studi Kasus PT. Tokopedia," SKANIKA, vol. 1, no. 1, 2018.
[24] R. A. Sekarwati, A. Sururi, R. Rakhmat, M. Arifin, and A. Wibowo, "Survey of Chatbot Testing Methods on Social Media to Measure Accuracy," SISFOTENIKA, vol. 11, no. 2, 2021, doi: 10.30700/jst.v11i2.1099.
[25] A. Zubaidi and Ramdani, "Layanan dan Informasi Akademik Berbasis Bot Telegram di Program Studi Teknik Informatika Universitas Mataram," JTIKA, vol. 1, no. 1, 2019.
[26] S. Narti, "Pemanfaatan ' Whatsap' Sebagai Media Komunikasi Dosen Dengan Mahasiswa Bimbingan Skripsi," J. Prof. FIS UNIVED, vol. 4, no. 1, 2017, [Online]. Available: http://www.vemale.com.
[27] F. Falah and Syamsidar, "Pengaruh Penerapan Aplikasi Chatbot Sebagai Media Informasi Online Terhadap Kepuasan Pengguna Layanan Kesehatan Primer di Masa Pandemik Covid-19," J. Kesehat. , vol. 2, no. 2, 2021, [Online]. Available: https://ejurnal.biges.ac.id/index.php/kesehatan/.
[28] D. W. Harahap and L. Fitria, "Aplikasi Chatbot Berbasis Web Menggunakan Metode Dialogflow," J. Inform. dan Teknol. Komput., vol. 1, no. 1, pp. 6–13, 2020.
[29] E. Noviana, O. Kurniaman, and M. N. Huda, "Pengembangan Aplikasi Bimbingan Tugas Akhir Mahasiswa Berbasis Website Pada Program Studi Pendidikan Guru Sekolah Dasar FKIP Universitas Riau," J. Prim. Progr. Stud. Pendidik. Guru Sekol. Dasar Fak. Kegur. dan Ilmu Pendidik. Univ. Riau, vol. 7, no. 1, pp. 1–12, 2018.
[30] P. Guru, S. Dasar, M. Pendidikan, U. N. Surabaya, and U. Zuhdi, "Pengembangan Aplikasi Chatbot Whatsapp Materi Pesawat Sederhana Bagi Siswa Kelas V Sekolah Dasar," JPGSD, vol. 10, no. 1, pp. 111–120, 2022.

[31] A. Fauziah, E. M. Kurnianti, and O. S. Hidayat, "Pengembangan Media Pembelajaran Website Chatbot Berbasis Pemecahan Masalah Pada Materi Penyajian Data Untuk Kelas IV Sekolah Dasar," J. UNP Kediri, vol. 9, no. 1, pp. 23–34, 2022, doi: 10.29407/e.v9i1.16348.

[32] W. A. Budi, U. Rahardja, and S. D. Maya, "Pengembangan Sistem Konsultasi Sebagai Monitoring Pelayanan Dosen dan Mahasiswa," Tek. Inform. , vol. 10, no. 2, 2017.

[33] D. Fajar Ramadhan, S. Noertjahjono, and J. Dedy Irawan, "Penerapan Chatbot Auto Reply Pada Whatsapp Sebagai Pusat Informasi Praktikum Menggunakan Artifical Intellegence Markup Language," J. Mhs. Tek. Inform., vol. 5, no. 12, 2019.

[34] A. Muhyidin and Nurkhamid, "Pengembangan Media Komunikasi Kehumasan Berbasis Chatbot 'UNYSA' Sebagai Layanan Informasi Tentang Universitas Negeri Yogyakarta," Pengemb. Media Komun., vol. 5, no. 1, 2019, [Online]. Available: https://www.researchgate.net/publication/337811779.

[35] M. Sidik, B. Gunawan, and D. Anggraini, "Pembuatan Aplikasi Chatbot Kolektor Dengan Metode Extreme Programming dan Strategi Forward Chaining," J. Teknol. Inf. dan Ilmu Komput., vol. 8, no. 2, pp. 293–302, 2021, doi: 10.25126/jtiik.202184298.