An Enhanced Framework for Academic Information Service Using AI Chatbots

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***Abstract*—**Students often overlook academic administration data services disseminated through different internet platforms. Using chat tools, students are often more dominant in directly addressing research program supervisors' queries. However, due to a staff shortage on the data provider side, data services through chat apps cannot be delivered adequately. Furthermore, academic staff output started to decline, although chatbot accuracy stayed at 100 percent in studies comparing chatbots to academic staff. Due to the assessment findings, chatbots successfully boost efficiency in dealing with client inquiries. Sixty-two respondents used chatbots, including 13.8 percent of lecturers, 9.2 percent of staff, and 76.9 percent of students. Capability, consistency, accountability, and performance are all aspects of chatbot technology testing. The significance threshold for the validity test is 5%. The test findings reveal that consumers' usage of chatbot technology to receive academic information is more trustworthy, with a Cronbach Alpha score of 0.82. Chatbots are being used to provide a solution for the academic community and the academic community to access services more swiftly and efficiently. Chatbots may lower academic personnel's burden and improve service quality at tertiary institutions. In this study, a chatbot was created to deliver data requests from consumers on its own.

Keywords— AI chatbot, dependability, academic services, technological impact, AI discussions, framework

DOI Number: 10.48047/nq.2022.20.19.NQ99191 **NeuroQuantology2022;20(19): 2263-2277**

I. INTRODUCTION

Most colleges now employ a web information system to communicate information on student registration, academics, scholarships, tuition costs, and other topics. In terms of educational services, universities, of course, must give the finest service possible so that the campus academic community and the community as a whole are satisfied with the services supplied. To gain the pleasure of the community and the campus academic community, colleges must offer consulting and information services in addition to

the quality of education and facilities. One of the facilities that is often utilized to satisfy information demands is the usage of web-based information service systems and social media.

Many recent innovations in website development have occurred in tandem with the advancement of web technology. Various services, such as using the phone, chatting, and others, are used to serve campus academic needs. All of these programs strive to improve communication between the school and the community both on and off campus. The fast advancement of computer-based information technology has brought about several changes in human existence, one of which is Artificial Intelligence technology. With AI technology, computers can perform specific tasks similar to humans, such as a chatbot. A chatbot is a technology that learns in the same way as humans do. So that computers can interpret natural language discussions with their users. Chatbot technology is useful in education, particularly at colleges. This is intended to service or respond to queries from students and potential students. This chatbot technology may also enhance service quality and make it more appealing for potential students to enroll at the institution.

The growing workload and volume of academic information demands on campus are causing academic leaders stress. The growth in students in each study program, as well as plans for new study programs, exhausts academic staff and makes them sluggish at work since they are unable to provide timely and appropriate services to students and the academic community. An academic information service is a service that delivers educational information to students, such as course schedules, study plans, study outcomes, student data, procedures, and other administration (James et al., 2016). Academic information must be acquired from the institution's Academic and Student Administration department. There is also the option of accessing instructional websites, which eliminates the requirement for students to go to campus (Kalbande & Chavan, 2016). Academic services available over the internet have been available for some time, but they are neither practical nor successful (Mogaji, 2016). Because students must go through multiple processes on the internet in order to access this information, such as logging in and then picking the menus supplied, such as study plans, study outcomes, and others. Furthermore, the interface has been unable to adapt to new devices and technological platforms such as mobile phones and tablets (Papadopoulos et al., 2017). Students struggle and make errors while picking menus or available links (Bandi & Fellah, 2018). With the advancement of web technologies (Hardi et al., 2021), There have been several advancements in website creation (Rusdi, Salam, et al., 2021). Today, academic services such as phone usage, chat, and others are utilized. All of these services strive to connect the college to the community both outside and within the campus, but each has limits.

Universities must deliver the greatest academic services possible (Pribadi et al., 2021), such that the campus academic community and the community are pleased with the services provided (Ula et al., 2021). The author has proposed a solution to the aforementioned issues by developing an autoresponder engine (chatbot) that can automatically reply to users' inquiries (Suhel et al., 2020). Life has changed dramatically as a result of the fast growth of computer-based information technology (Rusdi, Nurhayati, et al., 2021), Artificial Intelligence (AI) technology is one of them (Hanafi et al., 2022). Chatbot technology is one example of how AI technology allows computers to do certain activities comparable to those performed by people (Hardi et al., 2020). A chatbot-based solution enabling students to rapidly and easily access academic information services (Rodsawang et al., 2020).

A chatbot is an application that has been there since 1965 and is still evolving. Chatbots employ the notion of question and response in natural language (Tenemaza et al., 2020). Improved Chatbots to handle concerns with service quality (Chung et al., 2020), It is also utilized as a medium for distant learning. Chatbot, which is a conversation robot application, may make it

easier to find information (Oza et al., 2020), Users merely need to ask a query to the chatbot, and they will get the appropriate answer right away (Habib et al., 2021). Users may submit inquiries using standard messaging apps, where they seem to be questioning customer support operators directly in free language with no required structure. The chatbot engine will then analyse the question to find the most relevant question data in the database and offer the proper response (Hill et al., 2015). Chatbots are required and may be used in a variety of industries, including customer service chatbot applications (Xu et al., 2017). We are attempting to integrate a chatbot inside the institution, particularly in the academic division. The chatbot will concentrate on commonly asked queries about educational activities by students or guardians to administrative personnel.

II. Literature Review

A. *Chatbots*

Chatbots are extensively used in a variety of sectors, including healthcare, e-commerce, and all client contact centers ("27th Signal Processing and Communications Applications Conference, SIU 2019," 2019). Agribot, a machine that meets agricultural demands, is an example of a chatbot application, and farmers utilize this system (Sawant et al., 2019). Farmers utilize Agribot to discover the optimum plant species to cultivate based on soil, environmental, weather, and climatic factors. Another comparable research investigated the development of a chatbot tailored to answer typical Thai inquiries. (Muangkammuen et al., 2018). The chatbot has an accuracy score of 86.36% in comprehending queries and 93.2% in delivering replies based on the results of the testing. Users and experts have evaluated a knowledge-based intelligent chatbot for customer support. The system prototype assessment findings are good and support the notion that the system is effective (Ngai et al., 2021). According to the assessment, chatbot customer response times were much shorter than previously. Furthermore, human duties will have a far less influence, although chatbot accuracy remains 100% in testing comparing chatbots to human personnel. As a consequence, the assessment findings demonstrate that the design may significantly enhance efficiency in dealing with client enquiries. Chatbots are word processors integrated with artificial intelligence, therefore they may be built using a variety of approaches.

Chatbot technology debuted in the 1960s (Abu Shawar & Atwell, 2007). In 1966, Joseph Weizenbaum of the Massachusetts Institute of Technology (MIT) developed the first chatbot, ELIZA (ZEMČÍK, 2019). Chatbots are described in a number of ways by researchers, such as Artificial Intelligence conversational beings (Deshpande et al., 2017) (Dias et al., 2019). This amazing technology is also known as a virtual assistant (Dahiya, 2017)(Deshpande et al., 2017), chatterbot (Abu Shawar & Atwell, 2007)(Dias et al., 2019)(Journal & Souza, 2008), Chatbots, often known as digital assistants, (Abu Shawar & Atwell, 2007)(Deshpande et al., 2017). Meanwhile, Chatbot's objective is to replicate human communication. (Abu Shawar & Atwell, 2007)(Deshpande et al., 2017)(Dahiya, 2017)(Ranoliya et al., 2017). Chatbots are well-known software programs that may offer individuals with actual discourse in addition to their claimed objective of imitating human speech. Chatbots also attempt to simulate intelligent discussion with stakeholders (Deshpande et al., 2017)(Dahiya, 2017) involves the use of artificial intelligence through text-based media such as Natural Language Processing (NLP) (Dahiya, 2017)(Fabian & Alexandru-Nicolae, 2009)(Chakrabarti & Luger, 2015). NLP is a branch of computer science and linguistics that investigates the interaction of computers and natural human language. (Fabian & Alexandru-Nicolae, 2009). Furthermore, there are two kinds of chatbots: basic chatbots and smart chatbots, which are also known as rules-based and AI chatbots (Journal & Souza, 2008)(Maroengsit et al., 2019)(Khan & Das, 2018). A rule-based Chatbot is the most basic kind of Chatbot (Olga, 2017), because it responds to queries using a set of rules (Khan & Das, 2018). As the decision

maker, the developer specifies and responds to the built-in data set in order to identify knowledge and responses. Meanwhile, AI-powered chatbots are becoming increasingly sophisticated (Olga, 2017). The Chatbot was taught to answer enquiries from stakeholders using a machine learning technique by the developer (Olga, 2017), by responding to data provided and modifying their behavior in response to stakeholder interactions (Journal & Souza, 2008; Maroengsit et al., 2019). Year after year, changes occur in academic information services, ranging from conventional input via computers and mobile devices to the most recent web-based technologies and robotics, which will continue to develop for a higher quality of academic services at universities. as seen in Figure 1.

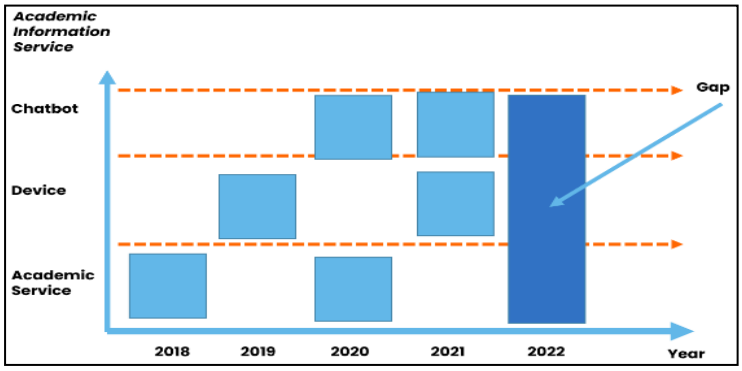

Fig. 1. Deployment of academic information service technology

B. *Academic information system*

The positive impact of globalization is the increasing speed of information flow. Advances in information technology offer many conveniences in various aspects of life, from personal needs to business activities. Recently information technology has become a very influential factor in the success of an organization and can be used as a strategy to maintain the trust of its users, including in educational institutions, especially universities. To develop its institutions to face increasingly fierce competition, every tertiary institution must have a robust and reliable management information system (Pribadi et al., 2021). The role of information technology will become increasingly important and decisive for an educational institution to increase its ability to face competition and provide satisfactory services for its students. Quality facilities are, of course, an added value for tertiary institutions, and ultimately an academic information system will become a service that must be available in a tertiary institution. The Academic Information System is specifically designed to meet the needs of higher education institutions that want computerized educational services to improve performance, service quality, competitiveness, and the quality of the Human Resources they produce (Hardi et al., 2020).

III. Material and Method

In the past, prospective students, students, and the general public had to phone, e-mail, visit the University website, and talk using WhatsApp to get information on new student registration, tuition fees, study program details, and other academic information. It takes a long time to acquire information, making it difficult for prospective students, especially when registration information and grades are required. As a consequence, we require a system that can react to questions from prospective students automatically. In the new system, the following steps will be followed.

The procedures utilized to collect research data on the student academic service framework using the mix approach are as follows. Data were gathered from academic leaders and students who had utilized and assessed the new method.

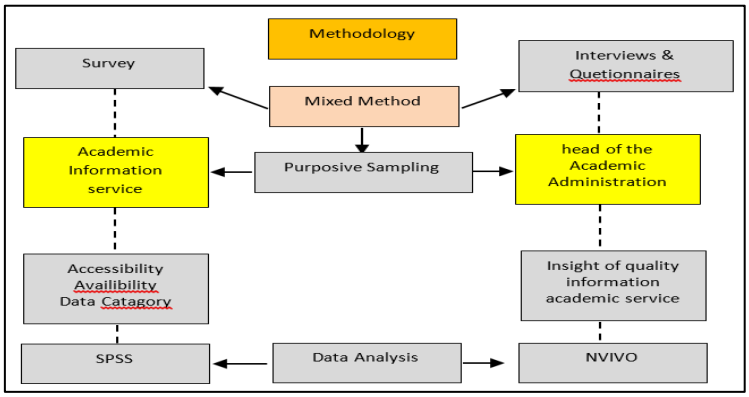

Fig. 2. Methodology-mixed technique

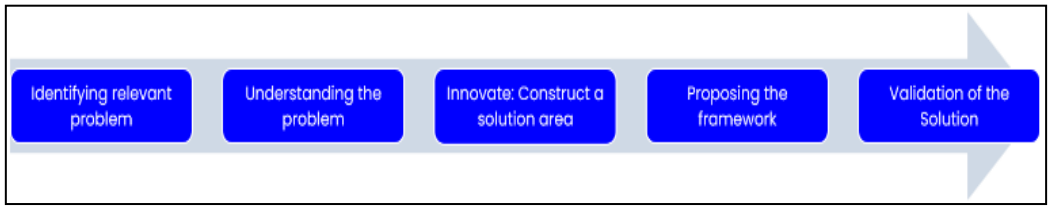

Fig. 3. Depicts the stages of system validation generation

The existing system employs a website and e-mail to provide students with system information, but contact is one-way only. Similarly, the answer that is acquired is not automated and does not get rapid reply, but it takes time, according to the work schedule of academic officials.

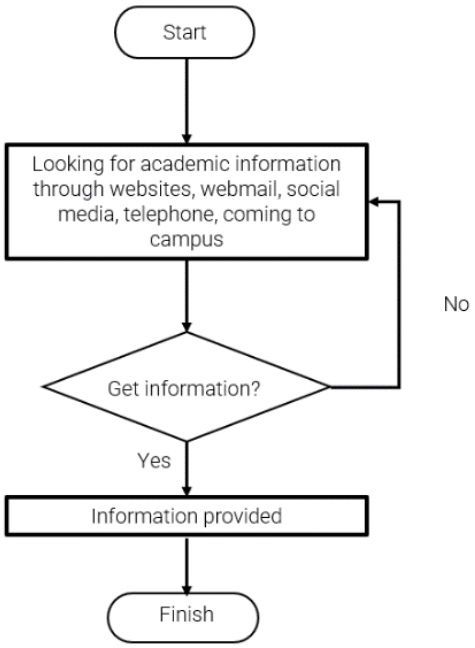

Fig. 4. Depicts the current system flow at College

The first step is to gather comments from students and the educational section in order to identify pertinent difficulties with academic services at the institution. Understanding the issue reduces the problem, gives creative solutions to the academic section based on digital services, presents a chatbot digital service framework that can be active 24 hours a day, and allows the educational section to assess the quality of chatbot-based services. Figure 5 shows some of the academic services that are provided.

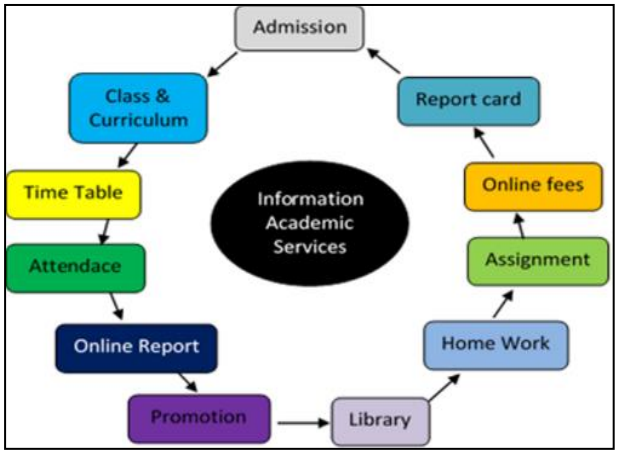

Fig. 5. Academic service at a university

Figure 6 shows a flowchart of the phases of academic services offered by chatbots at universities.

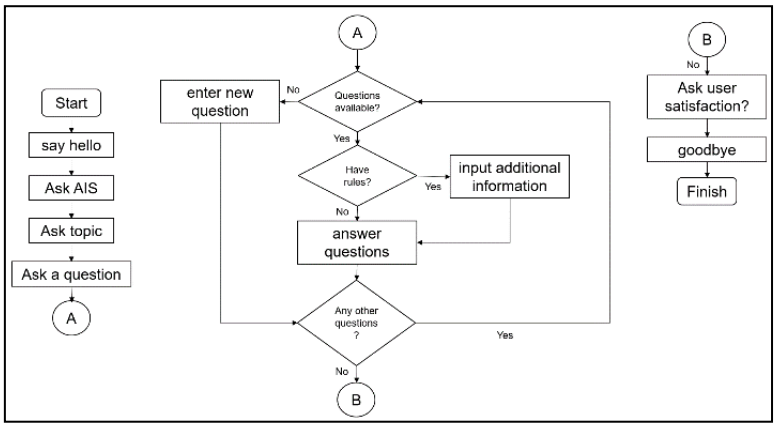

Fig. 6. AI chatbot dialogue flowchart

Artificial intelligence software is used by these chatbots. Unlike rule-based chatbots, this technology is more complex and conversational. Language usage may be developed and adjusted to meet certain words, sequences, synonyms, and easy methods to ask questions, among other things. Ensures that questions with similar meanings are addressed in the same manner. If computers are unable to detect and reply to requests, it is the responsibility of people to adjust the settings and respond to the message. Data-driven and predictive. These chatbots use more complicated, interactive, and customizable technologies than linguistic-based chatbots.

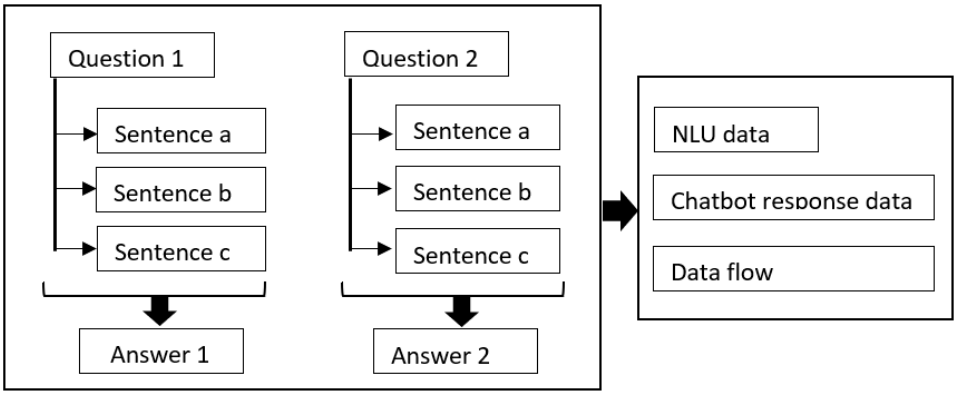

Fig. 7. Conversational Modeling Process

Natural Language Understanding (NLU) technology is used in the bot design to record what individuals say so that other users can understand it. Client responses may impress machine learning-based conversational systems. He naturally learned from his previous habits and experiences. Some advantages of using chatbots include 24 hour service, faster response or interaction with customers, reduced work time, elimination of errors often made by humans, and making it easier for business owners to improve their customer service. A chatbot is obviously different from a human when it comes to responding to dialogue. Humans need an emotional connection that machines lack. Additionally, chatbots are not always capable of responding to issues.

IV. Result and Discussion

System analysis outlines how input data is handled in order to create the desired result. The system detects the inquiries, analyses the datasets, and returns answers that are close to or identical to the present requests. Figure 7 displays the entire flow of the Chatbot system.

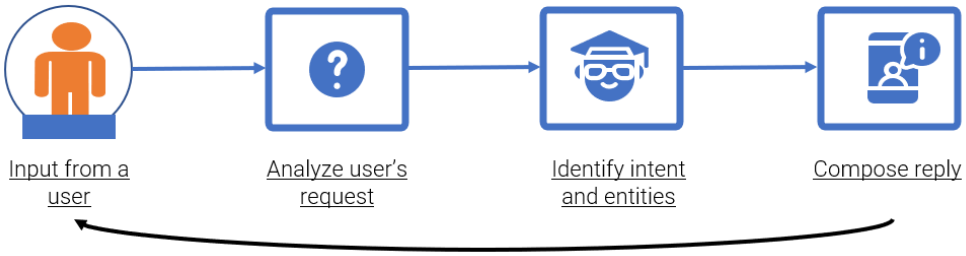

Fig. 8. How a Framework Functions

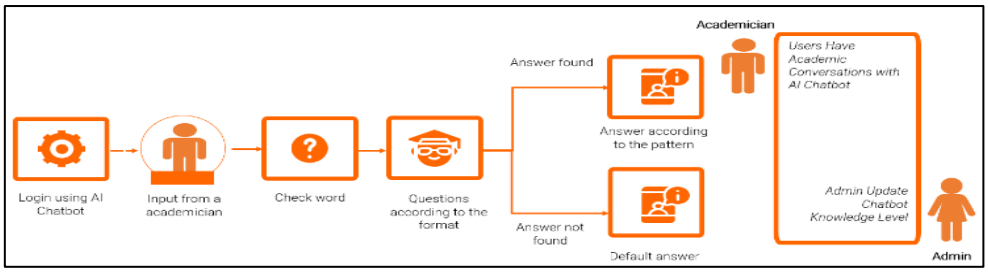

Fig. 9. The chatbot's word verification mechanism

The author created a database of 10 classes, each with at least five questions, as training data. Table 1 displays the data for each class.

TABLE I. 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 method is evaluated with values ranging from K = 1 to K = V, keeping in mind that the minimum number of data from a class is five; consequently, by applying a value of K = V, all study program objectives have a possibility of being identified. Table 2 displays the K-NN method's accuracy after testing with data from up to sixty questions.

TABLE II. 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.

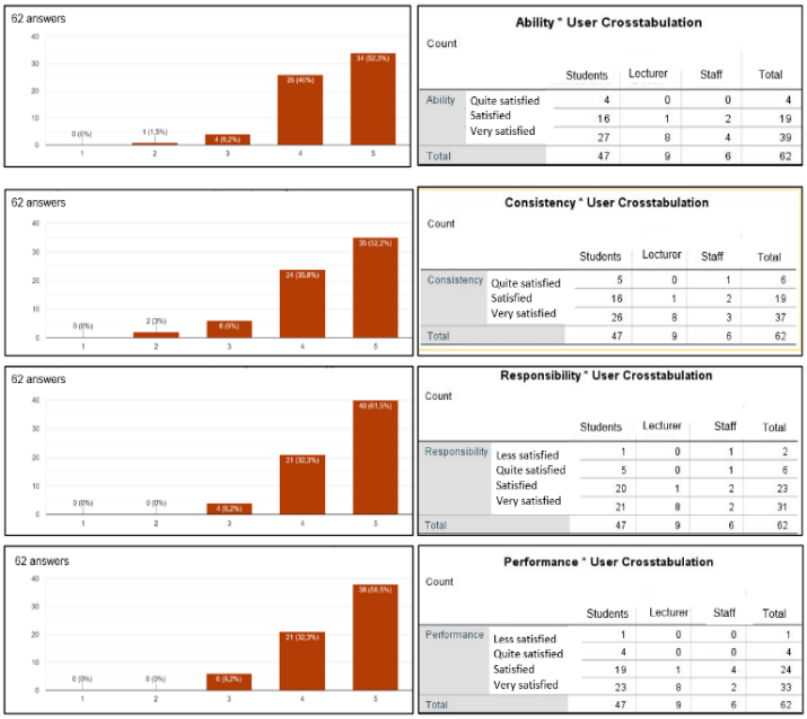

Fig. 10. Testing the chatbot system to 62 respondents

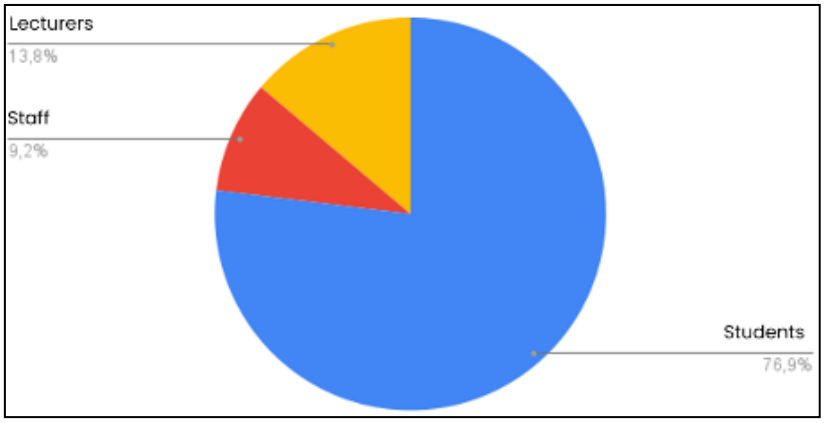

Fig. 11. Percentage of respondents

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.

A. 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 III. 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 IV. 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 variables, indicators, and values' test results are listed below.

TABLE V. 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 VI. 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 VII. T STATISTICS, P VALUE

	Koefisien	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	0,681	11,461	**0.000**

Use -> Actual System Use			

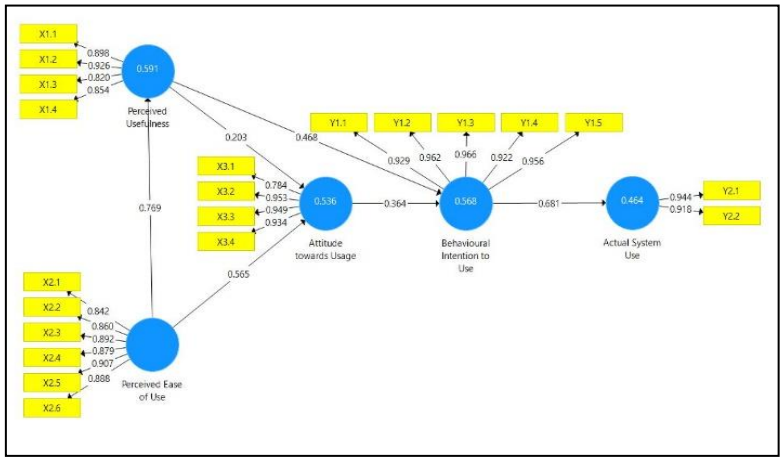

Fig. 12. AI Chatbot Academic in Services Test Results

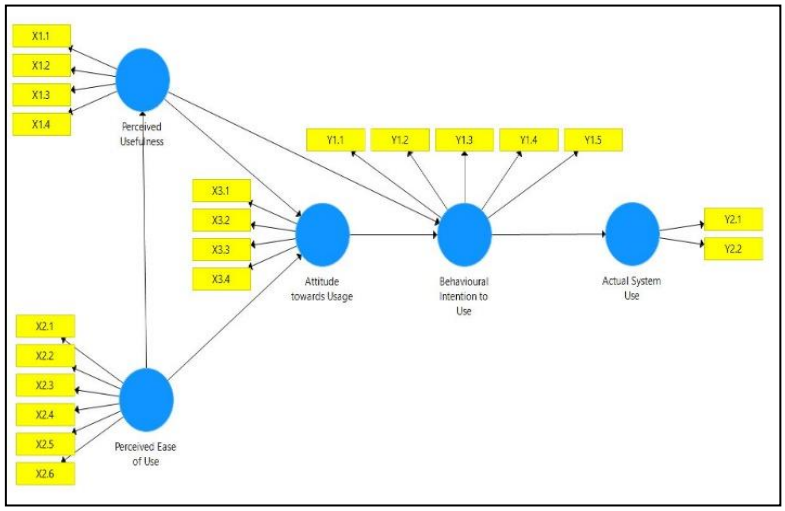

Fig. 13. Results - Artificial Intelligence Chatbot Academic

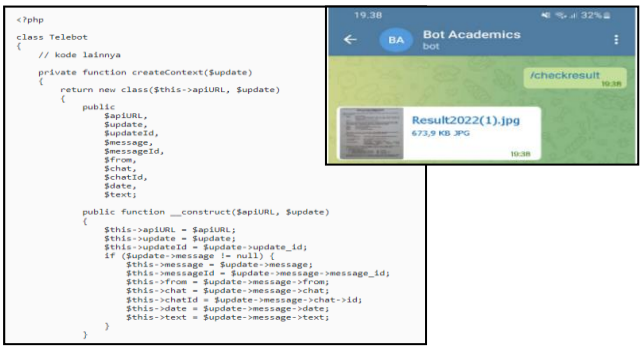

Fig. 14. Bot Academics

ACKNOWLEDGMENT

We would like to thank Universitas Mulia for funding this research and Universiti Teknikal Malaysia Melaka for assisting in the completion of this research.

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