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Designing AI Chatbots for Higher Education: A Study on Student Needs and Preferences

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ABSTRACT

The use of chatbots in higher education has been on the rise as institutions seek creative ways to improve student support services. Nonetheless, many university students still face difficulties in accessing timely and accurate information regarding academic matters, administrative processes, and campus facilities. This research explores the needs and expectations of students in developing an AI chatbot for a Malaysian university. The overall aim is to identify the types of questions students typically ask and how a chatbot can better serve and support them. A total of 76 students from a university participated in a Google Form survey comprising both close-ended and open-ended questions. Their responses were analyzed using thematic analysis to identify recurring themes and issues. These issues were categorized into areas such as academic inquiries, administrative support services, campus facilities, and system access. Additionally, students' preferences regarding the features and functionalities of a chatbot were also gathered to determine what would provide maximum benefit. The findings indicate that students strongly support the development of a university chatbot that is fast, easy to use, and capable of answering a broad range of questions. Many also highlighted the need for real-time feedback, convenient access to university systems, and active communication. Furthermore, students who are shy or prefer working independently found chatbots particularly helpful. Overall, the findings confirm a clear need for a specially tailored AI-based chatbot suited to university environments. The study presents key considerations for developers to address to meet student needs and enhance the overall digital support experience. Future improvements should include ongoing testing, regular content updates, and integration with existing university systems.

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1. Introduction

In recent years, higher education institutions have increasingly adopted AI technologies to improve the quality of student support services. Among these, AI-powered chatbots have emerged as a promising solution to provide timely, consistent, and accessible information [1]. As universities grapple with growing student populations and demand for digital-first services, chatbots can reduce administrative bottlenecks and streamline communication between students and institutional departments [2]. Despite this potential, many students still struggle to obtain accurate and instant answers to questions about academic matters, campus resources, and administrative processes.

The importance of this study lies in its potential to bridge the gap between student expectations and the actual capabilities of university support systems. By identifying what students truly need from a digital assistant, this research offers practical insight into building more efficient and user-oriented chatbots. Furthermore, as Malaysia moves toward becoming a digitally empowered nation, universities such as Universiti Islam Selangor (UIS) must align with these advancements to provide inclusive, accessible, and intelligent digital solutions that cater to diverse student demographics [3].

While prior studies have shown the benefits of rule-based chatbots in handling predefined queries [4], they often fall short when students use varied language, need contextual understanding, or ask novel questions. Moreover, many implementations have not accounted for user preferences in interaction design, linguistic diversity, or emotional intelligence [5]. There is limited localized research that systematically explores these gaps through real student data, particularly in the Malaysian or Islamic university context [6].

This study contributes by capturing the actual questions, expectations, and preferences of students through a structured survey and thematic analysis. Unlike many generic or system-centered chatbot frameworks, this paper offers a user-centered design approach grounded in local context. The findings are drawn from a real-world sample of 76 students at UIS, providing insights into how chatbots can better serve academic and administrative needs. Moreover, the study explores student sentiment, preferred functionalities, and potential chatbot roles beyond information retrieval—such as emotional support and independent learning aid [7].

The main objective of this research is to identify the types of questions university students commonly ask and the areas where they expect chatbot assistance. It also aims to analyze student preferences for chatbot design and functionalities, thereby guiding the development of a contextually relevant, AI-powered chatbot system for Malaysian higher education. By doing so, the study contributes toward improving digital support services and enhancing student engagement through intelligent automation [8].

This paper is structured as follows: Section 2 provides a review of relevant literature on AI chatbot applications in education. Section 3 outlines the methodology, including participant selection, data collection, and analytical approach. Section 4 presents the findings from both qualitative and quantitative data. Section 5 offers a discussion of the implications of the results, while Section 6 concludes the paper with a summary of key insights and recommendations for future development and research.

2. Literature Review

The use of AI-powered chatbots in higher education is now the focus of a range of research that highlights the need to understand the priorities and challenges in designing user-centered systems. A study by [3] showed that perceptions of ease of use, technical effectiveness, and practical benefits are key factors in the acceptance of chatbots among students. In addition to academic information

needs, students also value fast, user-friendly, and reliable responses from chatbots that support self-directed learning and 24/7 access to important university information [9][3].

Furthermore, Chukwuere has built a conceptual framework that combines psychological and technological aspects to understand the acceptance of generative AI chatbots in higher education [7]. Factors such as student optimism, technological discomfort, and ethics of AI use are important elements in the process of integrating chatbots in universities. This is in line with the findings of Chan *et al.,* who stated that students value AI chatbots that assist with writing and provide learning support, but at the same time raise concerns about information accuracy and data privacy [5].

Ahmad *et al.,* emphasize that the use of chatbots in educational institutions needs to be planned comprehensively, not just as a communication technology but also as a pedagogical tool [6]. They found that successful chatbots usually combine elements such as contextual adaptation, the ability to understand local languages, and functionality that goes beyond the boundaries of academic support alone. A bibliometric study by [10] also shows that the trend of AI chatbot publications and studies is increasing, proving that this field has a great impact and continues to grow globally. This opens up space for further studies that are more focused on the real needs of users in the context of Islamic and local education such as at Universiti Islam Selangor (UIS).

3. Methodology

3.1 Research Design

Information on requirements and expectations of university students for AI-powered chatbots is gathered in this paper using a survey-based research approach. A systematic questionnaire ensuring response collecting simplicity of access was developed using Google Forms. Google Forms is a tool for simple web form data collecting. One of their useful features is that the forms will immediately store your data to a Google Sheets [11]. The poll offers open-ended as well as closed-ended questions to gain both quantitative and qualitative insights.

3.2 Participants

The study included a representative sample of 76 university students ranging a variety of academic backgrounds. Participants were selected at random to provide a spectrum of points of view. To reflect a broad spectrum of chatbot expectations and needs, students from different academic years and departments were included into the selection criteria.

3.3 Survey Instrument

The questionnaire was designed to capture students' experiences, expectations and preferences regarding chatbot functionalities as shown in Table 1. It consisted of the following key questions:

Table 1
Key questions and response type

No.	Question	Response Type
1	What types of questions do you frequently have regarding university services?	Open-ended
2	Please select the areas in which you would like the chatbot to assist you.	Multiple choice (Academic Advising, Class Scheduling, Financial Aid, Campus Facilities, Library Resources, IT Support, Others)
3	Please provide a few examples of specific questions you would ask the chatbot.	Open-ended
4	Any other suggestions or comments about the chatbot?	Open-ended

3.4 Data Collection

The survey was distributed online via Google Forms, that allow the students/respondents to respond at their convenience. The data collection process was carried out for 2 months. Unlike fully anonymous surveys, students were required to provide their name and matric number, which allowed the researchers to identify their faculty and academic year. This method ensured that responses could be categorized based on academic background, which allows a more detailed analysis of chatbot requirements across different student groups. The study maintained ethical research practices, ensuring confidentiality and informing participants about the purpose of the survey before they provided their responses.

3.5 Data Analysis

The collected data was analysed using both quantitative and qualitative methods:

i. Descriptive Statistical Analysis: Frequencies and percentages were used to analyse responses from multiple-choice questions [12].
ii. Qualitative Analysis: Open-ended responses were examined using thematic analysis to identify common patterns in student expectations and requirements regarding chatbot functionalities [13].

3.6 Percentage Calculation

The formula to calculate the percentage for Descriptive Statistical Analysis is shown in Eq. (1) below:

$$Percentage\ \% = \frac{S}{N} \times 100\% \quad (1)$$

Where:

i. S is total number of selections.
ii. N is the total number of respondents.

4. Results and Findings

The data gathered from 76 students at universities who took part in the survey is shown in this section. Quantitative results using descriptive statistical analysis from closed-ended questions and qualitative insights using thematic analysis from open-ended responses make up the results.

4.1 User Demographics

The survey was conducted among 76 university students across various faculties and academic years. Student names and matriculation numbers were collected to identify their academic background and qualification. The results show a well-distributed mix of students, covering both early and senior academic levels. This diversity ensures a holistic view of chatbot expectations across the student population. Table 2 and Table 3 below show Distribution of Respondents by academic qualification and faculty.

Table 2
Qualification of Respondents

Academic Qualification	Number of Respondents
Matriculation	3
Diploma	16
Bachelor's Degree	57
Total	76

Table 3
Number of respondents based on faculty

Faculty	Number of Respondents
Faculty of Economics, Accounting and Management	13
Faculty of Shariah and Law	7
Faculty of Islamic Civilization Studies	21
Faculty of Education	13
Faculty of Creative Multimedia and Computing	18
Faculty of Social Sciences	1
Foundation Centre	3
Total	76

4.2 Thematic Analysis of Open-Ended Responses - Question 1

The open-ended responses from Question 1 were analysed using thematic analysis, resulting in seven recurring themes. Below are the themes along with example responses:

4.2.1 Academic services and course information

Students frequently asked about subjects, academic calendars, registration processes and class schedules.

i. *"What are the programs offered by UIS?"*
ii. *"Regarding adding or dropping subjects."*
iii. *"How is the student registration and exam registration system?"*

4.2.2 Campus facilities and infrastructure

Many comments related to physical facilities, room locations, lifts and maintenance.

i. *"The lift is often faulty at Parcel, and this affects students living on high floors."*
ii. *"Where are the lecture halls, and how do we use the provided facilities?"*
iii. *"Why is there often no water?"*

4.2.3 IT and system access

Students were concerned about MyPortal, online systems, internet access and e-resources.

i. *"Update MyPortal."*
ii. *"How to access past year exam papers?"*
iii. *"Wi-Fi connection around campus."*

4.2.4 Library and academic resources

Library usage and academic support tools were a common focus.

i. *"When will the library be open?"*
ii. *"References available in the library."*
iii. *"Is there a tool like ChatGPT for the Qiraat subject?"*

4.2.5 Fees, sponsorships, and financial aid

Questions about tuition fees, sponsorships and payment procedures appeared frequently.

i. *"Can you explain what factors influence the cost of studying at UIS?"*
ii. *"What documents are needed to apply for financial aid or fee assistance?"*
iii. *"Fee payment process."*

4.2.6 Student welfare and services

Students raised concerns about daily life, welfare and general services.

i. *"Can students use the computer lab?"*
ii. *"How to request a room change?"*
iii. *"Are international students allowed to enter UIS?"*

4.2.7 Miscellaneous feedback

Some responses included feedback and critique regarding university services.

i. *"How UIS plans to develop or improve its campus facilities in comparison to other institutions?"*

ii. *"Even if you ask the chatbot, it can only give general answers. It doesn't really know university services."*

4.3 Descriptive Statistical Analysis of Multiple-choice Question - Question 2

During the survey, based on the multiple-choice responses in Question 2, students were asked to select to select one or more areas in which they wanted chatbot assistance. Since this was a multiple-response question, respondents were allowed to choose multiple options, meaning the total number of responses exceeds the number of participants. The frequency and percentage for each selected area are calculated based on the number of respondents (N) to give a clear view of how many students selected each area. Table 4 below demonstrates the result.

Table 4
Frequency and percentage for each selected area

Support Area	Number of Selections (per total number of students = 76)	Percentage of Students (%)
Academic Advising	30	39.5
Class Scheduling	41	53.9
Financial Aid	45	59.2
Campus Facilities	51	67.1
Library Resources	49	64.5
IT Support	39	51.3
Others	14	18.2

4.4 Thematic Analysis of Open-Ended Responses - Question 3

The open-ended responses provided by students in Question 3 were analysed using thematic analysis. Thematic analysis involves identifying recurring patterns or categories within qualitative data. From the analysis of 76 student responses, several key themes emerged:

4.4.1 Academic services and scheduling

Many students expressed interest in chatbot support related to academic matters such as subject offerings, class schedules and lecturer information.

Example responses:

i. *"What are the programs offered by UIS?"*
ii. *"Where is the classroom listed in my schedule?"*
iii. *"Can I reschedule my class or suggest a new timetable to the program head?"*
iv. *"What subjects are included each semester?"*

4.4.2 Facilities and campus navigation

Students want assistance locating facilities and understanding how to use them, such as lecture halls, computer labs or accommodation.

Example responses:

i. *"Where is Tutorial Room 2212?"*
ii. *"Can international students use the UIS computer labs?"*
iii. *"Where is the admin building or academic office located?"*
iv. *"Is Room BT6014 used on Saturday, 12/4/2025?"*

4.4.3 Financial aid and fees

Numerous students asked about tuition fees, financial assistance, scholarships and billing.

Example responses:

i. *"How much is the postgraduate tuition fee each semester?"*
ii. *"How do I apply for a scholarship to pay my fees?"*
iii. *"Why are sponsorship allowances disbursed late every semester?"*
iv. *"What are the payment deadlines and fines for late subject registration?"*

4.4.4 Library and study resources

Students frequently inquired about library services, book availability and academic references.

Example responses:

i. *"Is this book available in the UIS library?"*
ii. *"Why are most library books in Indonesian or outdated?"*
iii. *"How can I access online books through the library?"*
iv. *"Can I get past year questions for subject BE02?"*

4.4.5 Student life and welfare

Some responses focused on welfare services, accommodation or general student life concerns.

Example responses:

i. *"What kind of accommodation is available for UIS students?"*
ii. *"How to request room changes for next semester?"*
iii. *"What help can a student get if their parent has passed away?"*
iv. *"Are there facilities for students with disabilities?"*

4.4.6 Technical and system support

Students raised concerns about campus IT systems and connectivity.

Example responses:

i. *"Why is the Wi-Fi not available on all levels?"*

ii. *"Why is it hard to download the exam slip or reserve a room?"*
iii. *"When will MyPortal be updated?"*

4.4.7 Event and timetable inquiries

Several responses included questions about campus activities, academic calendars and convocation.

Example responses:

i. *"When is the next convocation?"*
ii. *"When will the academic calendar be updated?"*
iii. *"What programs will be held this month?"*

4.4.8 Miscellaneous and personalized questions

Some students provided creative or highly specific examples that reflect real-world use cases.

Example responses:

i. *"Can you be my partner today? Are you happy today?"*
ii. *"How to save RM500 in one month without having to do a part-time job?"*
iii. *"Can chatbot help me answer a coding question?"*

Thematic analysis showed that students expect the chatbot to assist with academic matters, campus navigation, financial aid and access to library resources. Concerns also included welfare services and technical support like Wi-Fi and system access. Overall, students preferred a versatile chatbot that supports both academic and daily university life needs.

4.5 Thematic Analysis of Open-Ended Responses - Question 4

The open-ended responses for Question 4 were analysed using thematic analysis. Several key themes emerged from participants' comments, reflecting their expectations, suggestions and overall sentiment toward the chatbot.

4.5.1 Positive sentiment and encouragement

Many participants expressed hope and encouragement for the chatbot initiative. They wished success for the project and acknowledged its potential usefulness for students.

Example responses:

i. *"Hope everything goes smoothly."*
ii. *"All the best."*
iii. *"Wishing you success."*
iv. *"A chatbot that helps students is a must nowadays, and I hope this one will do the same."*

4.5.2 Suggestions for functional improvement

Participants suggested specific improvements to the chatbot's functionality. These include better performance, accuracy, responsiveness, and clarity of responses.

Example responses:

i. *"I hope this chatbot works like ChatGPT and has less lag than MyLMS."*
ii. *"Responsive, with accurate and helpful answers."*
iii. *"Able to provide answers quickly."*
iv. *"Summarize answers in a way that everyone can understand."*

4.5.3 Accessibility and comprehensive information

Some students highlighted the importance of the chatbot offering broad access to all UIS-related services and systems. They requested more support for accessing key platforms and information.

Example responses:

i. *"There should be more features that make it easier for students to understand or complete tasks."*
ii. *"Provide a chatbot that can access all information related to UIS, including fellow schedules and student welfare van timetables."*
iii. *"Include more help on how to access UIS systems."*

4.5.4 Support for independent students

Several respondents emphasized the value of the chatbot for students who prefer to work independently or are hesitant to seek help in person.

Example responses:

i. *"I think the chatbot is necessary because it helps students who are shy or prefer to work independently when solving problems or finding information."*

4.5.5 Usability and design

Participants also commented on the chatbot's user interface and suggested that it should be simple, modern, and accessible across different platforms.

Example responses:

i. *"Use a simple and modern layout."*
ii. *"Should be accessible outside its original platform."*
iii. *"Create a prototype or testing phase."*

4.5.6 Integration with academic content

Some comments indicated the need for the chatbot to support academic needs such as assisting with assignments, providing access to resources, and acting as a reference hub.

Example responses:

i. *"Add more books to the library."*
ii. *"To make the chatbot better, it should cover all areas and serve as a reference for UIS students."*
iii. *"Include questions with answer choices to guide users."*

4.5.7 Creative and miscellaneous suggestions

A few responses were light-hearted or unique, suggesting creative ideas or expressing philosophical reflections on chatbot technology.

Example responses:

i. *"Include the Rector's face."*
ii. *"Emotions only exist in humans. Suggestion: The chatbot should be smart enough to engage in debates or discussions. But the system must align with research and facts."*

4.5.8 No comment/uncertainty

Several students left this section blank or explicitly stated that they had no additional input.

Example responses:

i. *"None."*
ii. *"Not sure."*
iii. *"No suggestions."*

5. Discussion

The thematic analysis of the open-ended responses provides rich insight into students' expectations, preferences, and challenges related to the implementation of a university chatbot. The findings from the four analysed questions reveal critical areas of focus that should be considered in the chatbot's development and deployment.

5.1 Student Information Needs Are Diverse and Context-Specific [14]

From Question 3, it is evident that students expect the chatbot to address a wide range of inquiries. These include academic matters (e.g., course schedules, exam papers, graduation dates), administrative support (e.g., fee balance, access to official documents), campus facilities (e.g., library services, Wi-Fi issues), and general campus life (e.g., accommodation, transportation, events). This diversity indicates the need for a chatbot that is well-integrated with university databases and

capable of understanding and responding to varied student concerns in a dynamic, context-aware manner [15].

Furthermore, some responses blended academic queries with emotional or personal reflections, suggesting that students may also seek conversational or empathetic interaction from the chatbot [16]. This aligns with trends in AI where user experience and emotional intelligence play a growing role in conversational agent design [17].

5.2 Clear Demand for Accessibility, Convenience, and 24/7 Support [18]

As observed in the responses to Questions 1 and 4, students value fast, accessible, and self-service support. Many noted that the chatbot would be especially helpful for those who are introverted, new to the university, or unable to physically access certain services [19]. The chatbot is seen as a solution to bridge communication gaps between students and university departments, particularly after office hours or during weekends and holidays [20].

5.3 Expectations for Responsiveness, Accuracy, and Human-Like Interaction [19]

Students emphasized the importance of the chatbot being responsive, clear, and helpful (Questions 2 and 4). Suggestions included improving the quality of answers, reducing lag time, and ensuring up-to-date content. There were also calls for the chatbot to resemble advanced conversational models such as ChatGPT, with the ability to engage in meaningful and contextually relevant dialogue.

Some responses even hinted at a desire for the chatbot to have human-like attributes, such as emotional understanding and critical reasoning. While such expectations may exceed the capabilities of current university-grade bots, they highlight the aspirational standard students have based on their interactions with commercial AI tools [21].

5.4 Design, Integration and Content Limitations

While functional capability is crucial, usability was also a recurring theme. Students requested a simple and modern interface (Question 4) and suggested prototype testing before full deployment. The need for regular content updates and broader database integration was also noted, particularly to ensure accuracy regarding academic schedules, available resources, and university events [20].

In addition, some students expressed concern over limited access to library materials and suggested enhancing academic integration—such as guiding them to suitable reading materials, referencing past exam papers, or listing relevant faculty members and locations.

5.5 Students View the Chatbot as a Long-Term Solution, Not Just a Tool [18]

The responses reflected a clear belief that the chatbot should be more than just a transactional interface. It is viewed as a strategic tool that supports independence, self-navigation, and student empowerment [19]. The students expect it to serve as a guide through various stages of their academic journey, from orientation to graduation.

This deeper level of expectation suggests that chatbot design should move beyond scripted Q&A formats and towards adaptive, personalized, and data-driven assistance that can grow with the user over time.

5.6 Theoretical and Practical Implications, Study Limitations and Future Work

Theoretically, this study contributes to the growing literature on user-centered AI chatbot design in higher education by offering evidence-based insight into student expectations. It emphasizes the importance of contextual awareness, language adaptability, and emotional relevance in designing intelligent support systems. The findings reinforce human-computer interaction (HCI) and technology acceptance theories by showing how personalization and relevance influence user satisfaction.

Practically, the results provide direct design implications for developers and university decision-makers. Chatbots should support diverse question types—from academic scheduling to welfare concerns—and be integrated with existing university systems for seamless information access. Additionally, student feedback highlights the need for emotionally intelligent and responsive systems that cater to both independent and socially hesitant learners.

This study is limited by its sample size and focus on a single institution (Universiti Islam Selangor), which may restrict generalizability. Furthermore, while the study analyzed user expectations and needs, it did not evaluate chatbot performance or user experience with a real system prototype.

Future work should involve developing and testing an actual chatbot prototype based on these findings. This should include iterative usability testing, content expansion, and integration with systems such as e-learning platforms and student portals. A comparative study across multiple universities or countries could also provide broader insight into regional or cultural preferences in chatbot interaction.

6. Conclusion

This study shows that students see chatbots as a helpful tool for getting quick answers to academic and university-related questions. Many students shared that they want a chatbot that is fast, easy to use, and able to provide up-to-date information. These needs match past research that found chatbots can improve communication and support in educational settings. Previous studies also show that chatbot research is growing, especially in AI-powered systems that help universities. A recent bibliometric study confirmed that more researchers are focusing on making chatbots smarter and more useful for students. To meet these needs, universities should develop chatbots that are well-designed, tested with users, and always improving. With the right support, chatbots can be an important part of making university services more student-friendly and efficient.

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