



## Design and Implementation of an AI Chatbot for Prospective Student Support

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### Abstract

Traditional communication channels in higher education often struggle to handle the high volume of admission-related inquiries, leading to delays and limited access to accurate information. This study presents the design, implementation, and preliminary evaluation of an AI-powered chatbot developed to support prospective undergraduate students at Tai Solarin University of Education, Ijebu-Ode. The system integrates an institution-specific knowledge base with a Large Language Model (LLM) to respond to queries on admission requirements, application procedures, available programs, and general university information. The chatbot was implemented via a web-based interface with Firebase backend services and Google-based authentication, with natural language responses generated using the Google Gemini API. Evaluation was conducted using 20 admission-related queries derived from real-world student information needs. Responses were assessed by the researcher and two evaluators based on accuracy and relevance, using official university information as a reference. Results show that 19 out of 20 responses were fully accurate and one was partially accurate, reflecting strong performance within the defined scope. The system demonstrated consistent relevance across all queries, with response times ranging from 2 to 10 seconds depending on network conditions. Limitations include the small dataset and qualitative assessment approach. These findings establish the chatbot as an effective proof of concept for structured admission inquiries. Further research involving larger datasets and quantitative metrics is needed to validate scalability and real-world effectiveness.

**Keywords:** AI-powered Chatbot, Large Language Models, Natural Language Processing, User Interface, User Experience

### INTRODUCTION

The rapid advancement of digital technologies has significantly transformed how prospective students access information about higher education institutions (Alenezi et al., 2023). Universities are increasingly relying on

online platforms to disseminate information regarding admission requirements, application procedures, and available academic programs. (Habib et al., 2021). Despite these developments, prospective students often encounter challenges in obtaining accurate, timely, and institution-specific information. This difficulty is particularly evident when navigating complex admission processes, where incomplete or unclear information can lead to confusion, missed opportunities, or poor decision-making (Iloanya & Ifedili, 2019).

The widespread reliance on informal and unverified sources, such as social media

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#### Cite as:

Shosanya S. O., Olunrebi A. A., Kareem M. A. Akinwande D. O., and Babatunde M. A. (2025). Design and Implementation of an AI Chatbot for Prospective Student Support a. *Journal of Science and Information Technology (JOSIT)*, Vol. 19 No. 2, pp. 159-174.

platforms, online forums, and peer networks, further intensifies these challenges (Kapoor & Dwivedi, 2020). While such channels provide quick access to information, they frequently lack reliability and may disseminate outdated or inaccurate information. As a result, there is a growing need for systems that can provide consistent, accurate, and accessible admission-related information tailored to the specific context of individual institutions (Nguyen, 2025; Nikam et al., 2025).

Recent advancements in Natural Language Processing (NLP), particularly through Large Language Models (LLMs), have enabled the development of conversational agents capable of understanding and generating human-like language. These technologies have been widely adopted in chatbot systems to automate responses to user queries across various domains, including education. Chatbots offer the potential to provide instant, scalable, and interactive support, thereby improving user experience and reducing the workload on administrative staff (Reddy & Reddy, 2024; Hanabaratti et al., 2024).

However, despite the increasing adoption of chatbot systems in the educational system, several limitations persist. Many existing implementations are either generalized systems that lack domain-specific customization or institution-specific solutions that provide limited technical transparency and insufficient evaluation (Mikael et al., 2025). In particular, there is often a lack of clearly defined methodology, inadequate reporting of system architecture and prompting strategies, and minimal use of rigorous evaluation frameworks. Furthermore, existing studies rarely address the contextual needs of localized environments, where institutional requirements and user expectations may differ significantly from broader implementations (Muhammed, 2025).

This gap highlights the need for the development and systematic evaluation of context-aware chatbot systems that are tailored to specific institutional environments while maintaining methodological clarity and academic rigor. In response to this need, this study presents the design and implementation of an AI-powered chatbot developed to support prospective undergraduate students seeking admission into Tai Solarin University of Education (TASFUED), Ijebu-Ode. The system integrates a structured knowledge base with an

LLM to respond to queries related to admission requirements, application procedures, available programs, and general university information.

Unlike large-scale or highly complex chatbot systems, this study adopts a focused, proof-of-concept approach aimed at demonstrating the feasibility of integrating LLM-based conversational capabilities with institution-specific data. In addition to system development, the study emphasizes the importance of evaluation by assessing the chatbot's performance based on accuracy, relevance, and usability within a defined scope of admission-related queries.

## RELATED WORKS

The application of conversational agents in education has gained increasing attention with advancements in Natural Language Processing (NLP) and Large Language Models (LLMs). Educational chatbots have been developed to support a wide range of functions, including academic advising, administrative assistance, and student engagement. These systems are particularly valuable in addressing repetitive inquiries and improving access to institutional information (Aleedy et al., 2025; Hailu et al., 2024).

Several studies have demonstrated the effectiveness of chatbot systems in higher education contexts. Lee et al. (2020) developed a chatbot capable of responding to student queries across multiple platforms including, Telegram, Line, and Facebook Messenger, integrating both natural language and command-based interactions. Ten undergraduate computer science students participated in the survey. Their findings suggest that chatbot systems can reduce the workload of instructors and improve response efficiency. However, the study was limited to a small sample size and a narrow application domain focused primarily on course-related queries.

Similarly, Page and Gehlbach (2017) introduced "Pounce," a chatbot designed to support students during enrollment and financial aid processes. Their work highlights the ability of chatbots to deliver timely and relevant information during critical decision-making periods. While effective, such systems are often tailored to specific stages of the student lifecycle and may not address broader

informational needs, such as detailed admission requirements across diverse programs.

Aloqayli and Abdelhafez (2023) developed an intelligent chatbot system to improve university admission counseling services for prospective students by reducing wait times and extending service availability beyond standard business hours. The chatbot was built using the Botsify platform and evaluated by 42 postgraduate students, predominantly from Princess Nourah University, who interacted with it by submitting admission-related queries. Performance was assessed through the Chatbot Usability Questionnaire (CUQ) administered to 22 participants, yielding an average score of 76.6, and a Confusion Matrix analysis that recorded a classification accuracy of 91%. The findings demonstrated that the chatbot could correctly and adequately respond to prospective students' questions within its knowledge base, contributing a scalable, cost-effective solution that enhances institutional responsiveness and extends admission advisory support beyond conventional office hours. This study is limited to postgraduate students at Princess Nourah University.

Le Hoanh Su et al. (2020) created an AI chatbot to assist institutions with career counseling and admissions. They investigated, examined, and comprehended the challenges, flaws, and issues that arise in enrollment assistance and career counseling. The study utilizes a structured dataset about enrollment, orientation, and the use of machine learning and natural language processing to create identification models. The chatbot answers questions related to admissions counseling for students and parents. The work helps overcome and enhance university admissions consulting performance. The study is limited to the students' career counseling and admission guide using questions from the groups on the social network of the University of Economics and Law and the CCA department.

Mendez et al. (2020) explored the use of chatbot systems as mentoring tools to underrepresented minority PhD students in engineering who are thinking about going into academia or business. Their findings indicate

that while chatbots can provide accessible support, limitations remain in terms of personalization and the ability to replicate nuanced human interactions. These limitations are particularly relevant in contexts where users require detailed, context-specific guidance, such as university admissions.

A significant gap exists in the literature regarding localized chatbot systems tailored to specific institutional contexts. The existing literature focused on large-scale or generalized deployments, with limited attention given to the unique informational needs and constraints of individual universities, particularly undergraduate students in resource-constrained environments.

## **METHODOLOGY**

This study adopts a developmental research approach to design, implement, and evaluate an AI-powered chatbot for supporting prospective undergraduate students with admission-related inquiries at Tai Solarin Federal University of Education (TASUED), Ijebu-Ode. The methodology is structured to provide sufficient technical and procedural detail to support clarity, transparency, and partial replicability of the system.

### **Research Design**

A developmental research design was employed, focusing on the iterative development and preliminary evaluation of a functional chatbot prototype. This approach is appropriate for studies that aim to design and validate technological solutions within a defined application context.

The study is positioned as a proof-of-concept, demonstrating the feasibility of integrating a Large Language Model (LLM) with a structured institutional knowledge base to support admission-related queries. The development process involved successive refinements based on testing and feedback. The mobile and system views of the chatbot are shown in Figures 1 and 2, respectively.

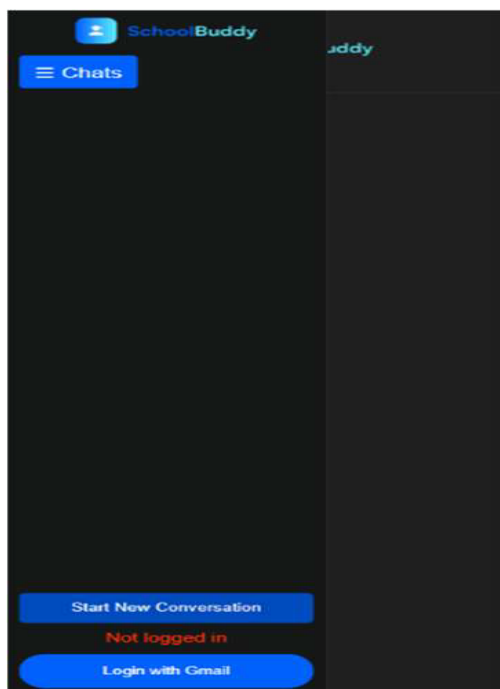


Figure 1. Mobile User interface of the chatbot application.

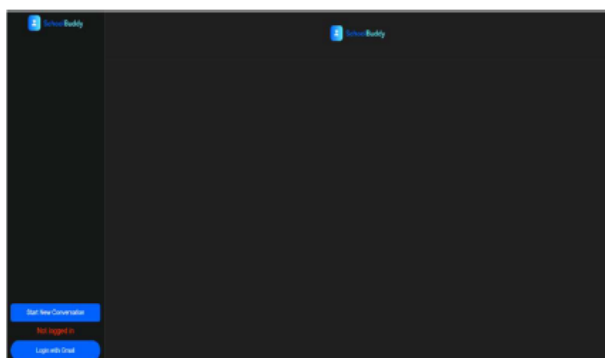


Figure 2. System User interface of the chatbot application.

### System Architecture and Components

The chatbot system consists of three primary components:

1. **User Interface (Frontend):** A web-based interface developed using Bootstrap, enabling prospective students to interact with the chatbot through a responsive and user-friendly environment. Users can input queries and receive responses in real time.
2. **Backend Infrastructure:** Firebase is utilized to manage backend operations, including:
  - i. Data storage (Firestore database)
  - ii. User authentication (Google Sign-In)
  - iii. Backend logic (Firebase Functions) for handling query processing and communication with the AI model
3. **AI Processing Component (LLM Integration):** The system integrates the Google Gemini model via Application Programming Interface (API) to handle natural language understanding and response generation. The LLM processes user queries and generates responses based on both its pre-trained knowledge and contextual information provided through prompts.

The model was accessed through an API interface using default configuration settings, as specific parameter tuning (e.g., temperature, token limits) was not explicitly controlled during implementation. Figure 3 shows the backend code of the chatbot application. Figure 4 also indicates how responses are generated by the chatbot.

```

# app.js M X {} package.json M .env M chat.html index.html
# app.js > universityData
1 // app.js
2 const express = require('express');
3 const path = require('path');
4 const { GoogleGenerativeAI } = require("@google/generative-ai");
5
6 const APIKey = "AIzaSyBvVEuFCekM40Duh9zXapnARF222xEi80";
7 const genAI = new GoogleGenerativeAI(APIKey);
8 const model = genAI.getGenerativeModel({ model: "gemini-1.5-flash-latest" });
9
10 const app = express();
11 app.use(express.json()); // Middleware to parse JSON body
12 app.use(express.urlencoded({ extended: true }));
13
14 const universityData = `General Overview
15 Established: 2005 (converted from Ogun State College of Education, founded in 1978).
16
17 Type: Public university focused on teacher education and applied disciplines.
18
19 Location: Ijebu-Ode, Ogun State, Nigeria.
20
21 Motto: "Education for Service."
22
23 Accreditation: Recognized by the National Universities Commission (NUC) and affiliated with the National Commission for C
24
25 Academic Structure
26 Faculties and Departments
    
```

Figure 3. Code terminal snippet displaying the institutional dataset utilized in the chatbot system.

```

app.use(express.static(path.join(__dirname, 'public')));
// Serve the index.html file at the root URL
app.get('/', (req, res) => {
  res.sendFile(path.join(__dirname, 'index.html'));
});
app.post("/ask", async (req, res) => {
  try {
    const { question } = req.body;
    if (!question || !universityData) {
      return res.status(400).json({ error: "Please provide both question and universityData." });
    }
    const prompt = `You are an AI assistant for a university. A student or soon to be student has asked: "${question}";
    const response = await model.generateContent(prompt);
    const aiResponse = response.response.text();
    res.json({ reply: aiResponse });
  } catch (error) {
    console.error(error);
    res.status(500).json({ error: "Something went wrong. Please try again later." });
  }
});
const PORT = process.env.PORT || 3000;
app.listen(PORT, () => console.log(`Server running on port ${PORT}`));
    
```

Figure 4. Terminal code snippet demonstrating how the chatbot generates responses.

### Knowledge Base Development

A structured knowledge base was developed to ensure that responses are grounded in accurate and institution-specific information. The knowledge base was constructed using official sources, including:

- i. University admission guidelines
- ii. University website content
- iii. Publicly available admission documents

The data was manually curated and organized into key categories such as:

- i. Admission requirements
- ii. Application procedures
- iii. Available programs and faculties

- iv. General university information

This information was stored in Firebase (Firestore) in a structured format to support efficient retrieval during query processing. While efforts were made to ensure accuracy through cross-verification with official sources, the knowledge base remains limited in scope and requires periodic updates to maintain relevance.

### Prompting Strategy

The system employs a keyword-triggered prompting approach to guide response generation. When a user submits a query:

- i. The backend performs basic keyword extraction to identify relevant terms (e.g., “cut-off mark,” “course requirements,” “application process”).

- ii. These keywords are used to determine the context of the query and retrieve relevant information from the knowledge base.
- iii. A structured prompt is then dynamically generated, combining:
  - o The user’s original query
  - o Retrieved contextual information
  - o Instructional cues to guide the LLM toward generating accurate and relevant responses

This approach represents a simplified form of Retrieval-Augmented Generation, where external knowledge is incorporated into the prompt to improve response quality.

### System Workflow

The chatbot operates through the following sequence, as shown in Figure 5:

- i. User authentication via Google Sign-In
- ii. Query submission through the web interface
- iii. Keyword extraction and intent identification
- iv. Retrieval of relevant information from the knowledge base
- v. Dynamic prompt construction
- vi. Query submission to the LLM via API
- vii. Response generation and return to the user interface

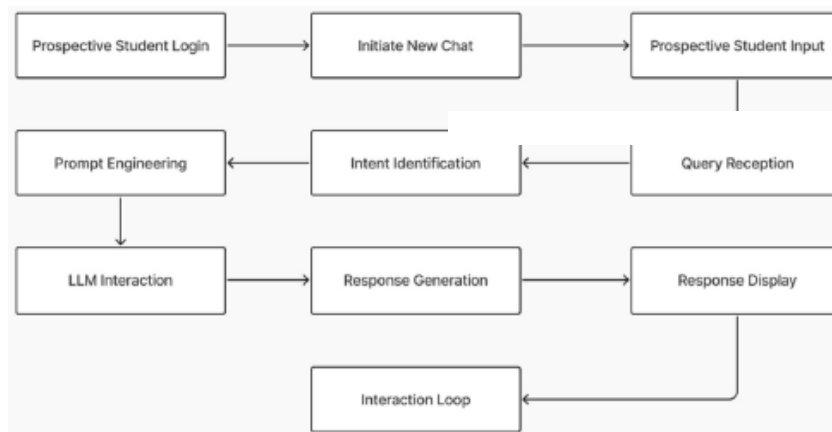


Figure 5. Chatbot system workflow.

## EVALUATION DESIGN

### Test Query Development

A total of 20 test queries were developed to evaluate the chatbot’s performance. These queries were derived from real-world student information needs and were collected through:

- i. Online platforms and frequently asked admission questions, such as Admission requirements, application procedures, Program information, and general university inquiries
- ii. Direct input from prospective students.

### Evaluation Procedure

The chatbot was tested using the predefined set of queries. Responses generated by the system were recorded and evaluated manually.

Each response was classified into one of four categories:

- i. **Accurate:** Fully correct and complete
- ii. **Partially Accurate:** Correct but incomplete or containing minor inaccuracies
- iii. **Inaccurate:** Incorrect or misleading
- iv. **Irrelevant:** Not related to the query

To ensure consistency, evaluations were based on comparison with official university information sources. However, no formal inter-rater reliability metrics were calculated, which represents a limitation of the evaluation process.

### Evaluation Metrics

The system was evaluated based on the following criteria:

- i. **Accuracy:** The correctness of the chatbot's responses relative to official admission information
- ii. **Relevance:** The degree to which responses addressed the intent of the query
- iii. **Response Time:** The time taken for the chatbot to generate responses, observed to range between approximately 2 and 10 seconds, depending on network conditions and API response latency.
- iv. **Usability (Qualitative):** Observations of ease of interaction and clarity of responses during testing

## RESULTS AND DISCUSSION

This section presents the results of findings from the evaluation of the AI-powered chatbot. The evaluation focused on response accuracy, relevance, and system performance within a defined scope of frequently asked admission questions.

### Accuracy of Responses

The chatbot's performance was evaluated using 20 predefined queries derived from real-world student information needs. Each response was assessed against official university admission information and categorized as accurate, partially accurate, inaccurate, or irrelevant. The results indicate that:

- i. 19 responses (95%) were fully accurate
- ii. 1 response (5%) was partially accurate
- iii. 0 responses were inaccurate or irrelevant

These results suggest that the chatbot performs effectively within the defined domain of admission-related queries. However, the high accuracy rate must be interpreted with caution, as the test queries were largely aligned with the structured knowledge base and consisted primarily of straightforward, frequently asked questions. Tables 1-4 indicate the accuracy of responses.

### Relevance of Responses

In addition to accuracy, the relevance of responses was assessed based on how well the chatbot addressed the intent of each query. All responses were found to be relevant to the user's input, indicating that the system consistently maintained contextual alignment.

Nevertheless, relevance does not necessarily imply completeness. The presence of a partially accurate response demonstrates that while the chatbot may correctly interpret user intent, it may not always provide fully comprehensive answers, particularly for queries requiring more detailed information. The findings regarding the relevance of the chatbot's responses were shown in Figures 6 to 13. Additionally, Tables 5-8 indicate the relevance of the chatbot responses.

### System Performance

The performance is considered acceptable for a web-based conversational system; however, response time variability highlights the system's dependence on external API services and network stability, which may impact user experience in real-world deployment.

**Table 1.** Accuracy of Chatbot Responses to Admission Requirement Test Queries.

S/N	Test Query (Admission Focused)	Chatbot Response	Accuracy Assessment
1	What are the general O-Level requirements for undergraduate admission?	O'Level requirements for undergraduate admission are 5 credits in SSCE/NECO (including English & Math), or 6 credits at not more than two sittings. Subject-specific requirements vary by course.	Accurate
2	Is a credit in English Language compulsory for all courses?	Yes, a credit in O-Level English Language is mandatory for all courses.	Accurate
3	What are the UTME subject combinations for Computer Science?	Mathematics, Physics, and one of Biology, Chemistry, Agricultural Science, Economics, or Geography.	Accurate
4	What are the O-Level requirements for studying English Language?	A credit in O-Level English Language is mandatory for all courses, including English Language. For English Language specifically, a credit in Literature in English is also required.	Accurate
5	Can I apply for Direct Entry with an NCE? If so, what's the general requirement?	Yes, you can apply for Direct Entry with an NCE. The general requirement is an NCE with at least Merit in two core subjects relevant to the program you wish to apply for.	Accurate
6	What are the specific O-Level and UTME subjects for Agricultural Science?	O-Level: Five credits at one sitting or six credits at two sittings, including English Language, Mathematics, Biology/Agricultural Science, Chemistry, and one other relevant subject (Geography, Physics, or Economics are suggested). UTME Subjects: English Language, Biology/Agricultural Science, Chemistry, and one other Science subject (Physics or Mathematics are suggested).	Accurate
7	Do I need a credit in Mathematics for Social Science-based courses like Economics?	Yes, a credit in O-Level Mathematics is required for all Social Science-based courses.	Accurate

**Table 2.** Accuracy of Chatbot Responses to Application Process Test Queries.

S/N	Test Query (Admission Focused)	Chatbot Response	Accuracy Assessment
1.	How do I start my undergraduate application process at TASUED?	To start your undergraduate application process at TASUED, you need to: <b>For UTME Candidates:</b> 1. Choose TASUED as your first choice in JAMB. 2. Participate in TASUED's post-UTME screening (document verification and aptitude test). 3. Check your admission status via JAMB CAPS or the TASUED portal. <b>For Direct Entry Candidates:</b> 1. Submit academic transcripts and NCE/ND/HND certificates to the admissions office. Following admission, you'll need to submit original documents (O-Level results, birth certificate, etc.), pay acceptance and tuition fees, and complete registration. Always check the TASUED website or	Accurate

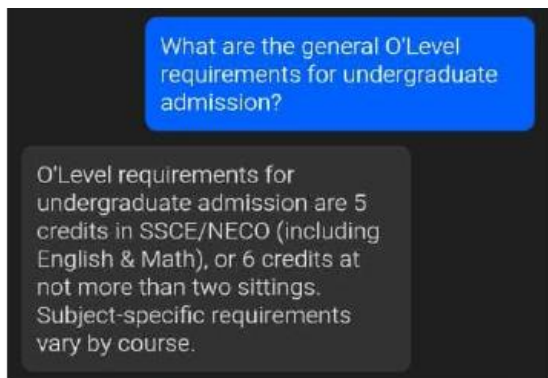
		JAMB CAPS for the most up-to-date deadlines and requirements.	
2	What is the current application deadline for undergraduate admission?	The provided text states that admission deadlines and requirements should be verified on the TASUED portal or JAMB CAPS, as they vary yearly. Therefore, I cannot provide a specific current deadline.	Partially accurate
3	What documents are typically required for application submission?	For undergraduate applicants, O'Level (SSCE/NECO) results with 5 credits at one sitting or 6 at most two sittings (including English and Math – specific subject requirements vary by course), UTME scores meeting TASUED's course-specific cutoff, and completion of the mandatory Post-UTME screening are required. Direct entry applicants need an NCE, ND, HND, or equivalent in a relevant field. Postgraduate applicants need a minimum of a Second Class Lower Bachelor's degree in a related field and an NYSC discharge certificate (for Nigerian graduates).	Accurate
4	Where can I find the official application portal link?	<a href="https://tasued.edu.ng">https://tasued.edu.ng</a>	Accurate
5	Is there a post-UTME screening?	Yes, a Post-UTME screening is mandatory for eligible candidates.	Accurate

**Table 3.** Accuracy of Chatbot Responses to Available Programs/Faculties Test Queries.

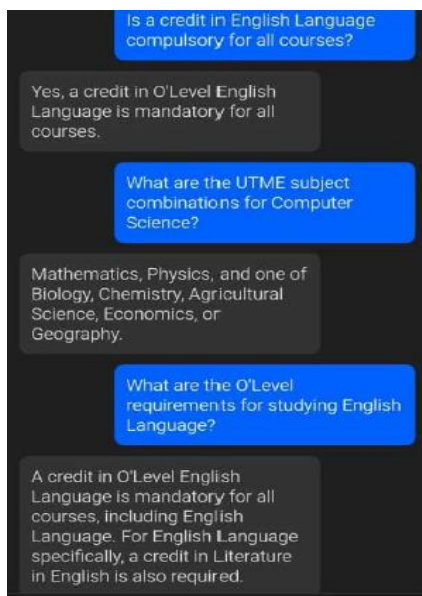
S/N	Test Query (Available Programs/Faculties)	Chatbot Response	Accuracy Assessment
1	List the colleges available at TASUED.	TASUED has five colleges: College of Specialized and Professional Education (COSPED), College of Science and Information Technology (COSIT), College of Humanities (COHUM), College of Management and Social Sciences (COSMAS), College of Vocational and Technical Education (COVTED)	Accurate
2	Which departments are under the College of Management and Social Sciences (COSMAS)?	Sociological Studies, Political Science, Geography and Environmental Management, and Economics.	Accurate
3	Do you offer a program in Early Childhood Education?	Yes, Tai Solarin University of Education offers a program in Early Childhood Education.	Accurate
4	Which college offers Engineering programs? (This tests if it correctly identifies that TASUED is an Education university primarily, and might not offer traditional 'Engineering' but 'Technical Education').	No. Tai Solarin University of Education (TASUED) does not offer engineering programs.	Accurate
5	What are some programs offered in the College of Vocational and Technical Education (COVTED)?	The College of Vocational and Technical Education (COVTED) offers Business Education, Agricultural Science, Home Economics, Hotel Management, and Technical Education.	Yes

**Table 4.** Accuracy of Chatbot Responses to General University Information Test Queries.

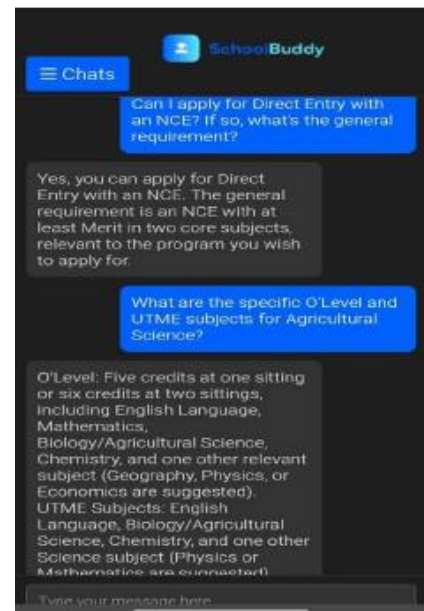
S/N	Test Query (Available Programs/Faculties)	Chatbot Response	Accuracy Assessment
1	Where is Tai Solarin University of Education located?	Ijebu-Ode, Ogun State, Nigeria.	Accurate
2	What is the university's mission statement?	To enhance the quality of teaching and learning by continuously updating the methods and skills of knowledge providers, equipping them with modern technology services delivered by skilled and motivated staff to meet contemporary and future needs of Nigeria, with the capability to compete globally.	Accurate
3	How can I contact the Admissions Office if I have more questions?	The Admissions Office can be contacted at admissions@tasued.edu.ng or +234 803 478 5077.	Accurate



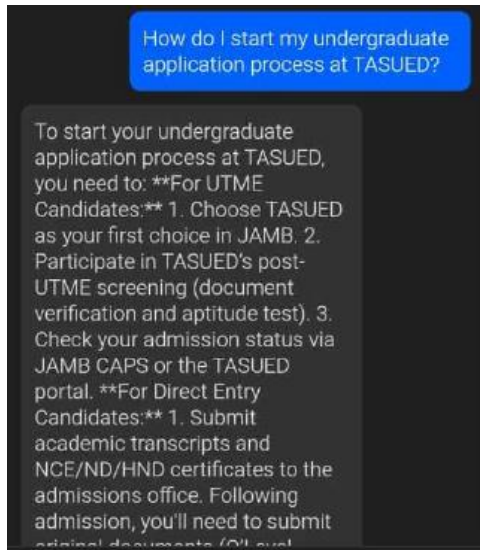
**Figure 6.** Chatbot response to “What are the general O'Level requirements for Undergraduate admission?”



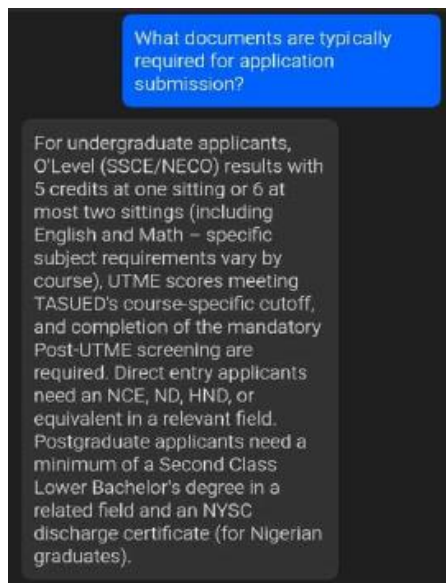
**Figure 7.** Chatbot response to “Is a credit in English Language compulsory for all courses?”, “What are the UTME subject combinations for Computer Science?”, and “What are the O'Level requirements for studying English Language?”



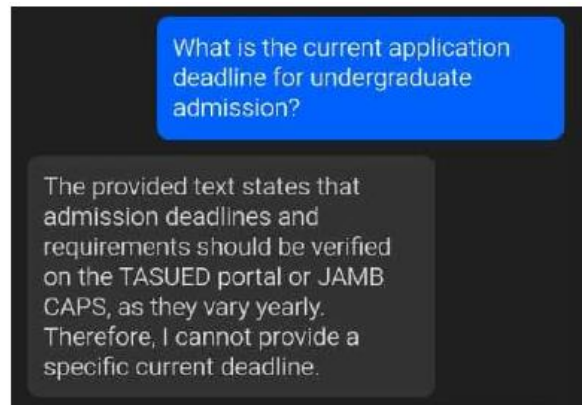
**Figure 8.** Chatbot response to “Can I apply for Direct Entry with an NCE? If so, what's the general requirement?”



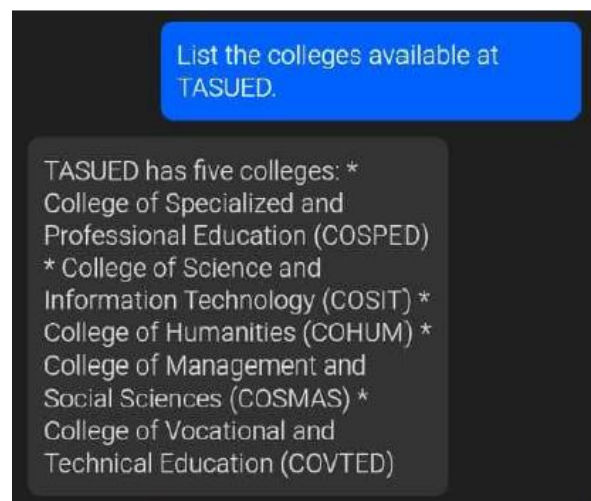
**Figure 9.** Chatbot response to “How do I start my undergraduate application process at TASUED?”



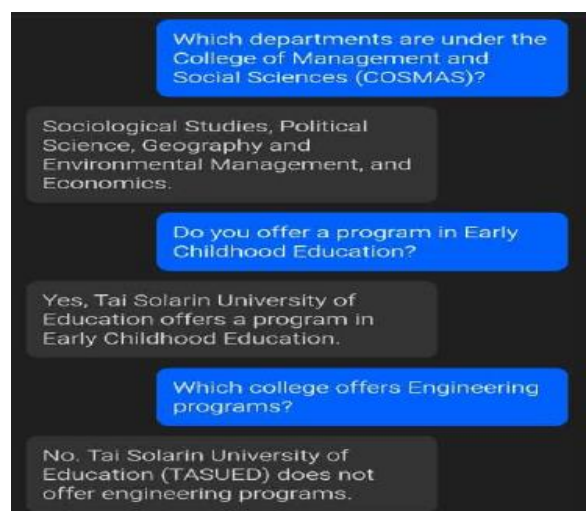
**Figure 10.** Chatbot response to “What documents are typically required for application submission?”



**Figure 11.** Chatbot response to “What is the current application deadline for undergraduate admission?”



**Figure 12.** Chatbot response to “List the colleges available at TASUED.”



**Figure 13.** Chatbot response to “Which departments are under the College of Management and Social Sciences (COSMAS)? Do you offer a program in

Early Childhood Education? “Which college offers Engineering programs?”

**Table 5.** Relevance of Chatbot Responses to Admission Requirement Test Queries.

S/N	Test Query (Admission Focused)	Chatbot Response	Relevant /Irrelevant
1	What are the general O-Level requirements for undergraduate admission?	O-Level requirements for undergraduate admission are 5 credits in SSCE/NECO (including English & Math), or 6 credits at not more than two sittings. Subject-specific requirements vary by course.	Relevant
2	Is a credit in English Language compulsory for all courses?	Yes, a credit in O-Level English Language is mandatory for all courses.	Relevant
3	What are the UTME subject combinations for Computer Science?	Mathematics, Physics, and one of Biology, Chemistry, Agricultural Science, Economics, or Geography.	Relevant
4	What are the O-Level requirements for studying English Language?	A credit in O-Level English Language is mandatory for all courses, including English Language. For English Language specifically, a credit in Literature in English is also required.	Relevant
5	Can I apply for Direct Entry with an NCE? If so, what's the general requirement?	Yes, you can apply for Direct Entry with an NCE. The general requirement is an NCE with at least Merit in two core subjects relevant to the program you wish to apply for.	Relevant
6	What are the specific O-Level and UTME subjects for Agricultural Science?	O-Level: Five credits at one sitting or six credits at two sittings, including English Language, Mathematics, Biology/Agricultural Science, Chemistry, and one other relevant subject (Geography, Physics, or Economics are suggested). UTME Subjects: English Language, Biology/Agricultural Science, Chemistry, and one other Science subject (Physics or Mathematics are suggested).	Relevant
7	Do I need a credit in Mathematics for Social Science-based courses like Economics?	Yes, a credit in O-Level Mathematics is required for all Social Science-based courses.	Relevant

**Table 6.** Relevance of Chatbot Responses to Application Process Test Queries

S/N	Test Query (Admission Focused)	Chatbot Response	Relevant /Irrelevant
1	How do I start my undergraduate application process at TASUED?	To start your undergraduate application process at TASUED, you need to: <b>For UTME Candidates:</b> 1. Choose TASUED as your first choice in JAMB. 2. Participate in TASUED's post-UTME screening (document verification and aptitude test). 3. Check your admission status via JAMB CAPS or the TASUED portal. <b>For Direct Entry Candidates:</b> 1. Submit academic transcripts and NCE/ND/HND certificates to the admissions office. Following admission, you'll need to submit original documents (O-Level results, birth certificate, etc.), pay acceptance and tuition fees, and complete registration. Always check the TASUED website or JAMB CAPS for the most up-to-date deadlines and requirements.	Relevant
2	What is the current application deadline for undergraduate admission?	The provided text states that admission deadlines and requirements should be verified on the TASUED portal or JAMB CAPS, as they vary yearly. Therefore, I cannot provide a specific current deadline.	Relevant
3	What documents are typically required for application submission?	For undergraduate applicants, O'Level (SSCE/NECO) results with 5 credits at one sitting or 6 at most two sittings (including English and Math – specific subject requirements vary by course), UTME scores meeting TASUED's course-specific cutoff, and completion of the mandatory Post-UTME screening are required. Direct entry applicants need an NCE, ND, HND, or equivalent in a relevant field. Postgraduate applicants need a minimum of a Second Class Lower Bachelor's degree in a related field and an NYSC discharge certificate (for Nigerian graduates).	Relevant
4	Where can I find the official application portal link?	<a href="https://tasued.edu.ng">https://tasued.edu.ng</a>	Relevant
5	Is there a post-UTME screening?	Yes, a Post-UTME screening is mandatory for eligible candidates.	Relevant

**Table 7.** Relevance of Chatbot Responses to Available Programs/Faculties Test Queries.

S/N	Test Query (Available Programs/Faculties)	Chatbot Response	Relevant /Irrelevant
1	List the colleges available at TASUED.	TASUED has five colleges: College of Specialized and Professional Education (COSPED), College of Science and Information Technology (COSIT), College of Humanities (COHUM), College of Management and Social Sciences (COSMAS), College of Vocational and Technical Education (COVTED)	Relevant
2	Which departments are under the College of Management and Social Sciences (COSMAS)?	Sociological Studies, Political Science, Geography and Environmental Management, and Economics.	Relevant
3	Do you offer a program in Early Childhood Education?	Yes, Tai Solarin University of Education offers a program in Early Childhood Education.	Relevant
4	Which college offers Engineering programs? (This tests if it correctly identifies that TASUED is an Education university primarily, and might not offer traditional 'Engineering' but 'Technical Education').	No. Tai Solarin University of Education (TASUED) does not offer engineering programs.	Relevant
5	What are some programs offered in the College of Vocational and Technical Education (COVTED)?	The College of Vocational and Technical Education (COVTED) offers Business Education, Agricultural Science, Home Economics, Hotel Management, and Technical Education.	Relevant

**Table 8.** Relevance of Chatbot responses to general university information test queries

S/N	Test Query (Available Programs/Faculties)	Chatbot Response	Relevant /Irrelevant
1	Where is Tai Solarin University of Education located?	Ijebu-Ode, Ogun State, Nigeria.	Relevant
2	What is the university's mission statement?	To enhance the quality of teaching and learning by continuously updating the methods and skills of knowledge providers, equipping them with modern technology services delivered by skilled and motivated staff to meet contemporary and future needs of Nigeria, with the capability to compete globally.	Relevant
3	How can I contact the Admissions Office if I have more questions?	The Admissions Office can be contacted at admissions@tasued.edu.ng or +234 803 478 5077.	Relevant

### **Interpretation of Findings**

The observed performance indicates that the chatbot is most effective when handling structured and frequently asked queries. This can be attributed to the alignment between user queries and the curated knowledge base, as well as the effectiveness of the keyword-triggered prompting strategy.

However, the presence of partially accurate responses suggests limitations in handling more complex or nuanced queries. These limitations are consistent with known challenges associated with systems built on large language models, including sensitivity to prompt design and the potential for incomplete information generation.

### **Practical Implications**

The findings suggest that the chatbot can serve as a useful support tool for handling routine admission-related inquiries, potentially reducing the workload on administrative staff and improving access to information for prospective students.

### **Comparison with Existing Studies**

The results of this study are consistent with existing research on educational chatbots in the literature, which indicates that such systems are effective for handling routine and structured queries but may struggle with more complex or context-dependent interactions.

## **CONCLUSION**

This study focused on the design, development, and initial evaluation of an AI-powered chatbot meticulously tailored to address the immediate informational needs of prospective undergraduate students seeking admission into Tai Solarin University of Education, Ijebu-Ode, to provide accurate and timely information related to admission requirements, the application process, available programs, and general university details relevant to potential applicants. Overall, the chatbot demonstrates strong performance within a controlled and well-defined domain, with high accuracy and consistent relevance. However, the limitations of the evaluation design and dataset size necessitate cautious interpretation of the results. The findings should therefore be considered preliminary, providing a foundation for further research and system improvement.

### **Recommendation and Future Works**

Building on the insights from the chatbot's development and evaluation, this research outlined key recommendations for its future enhancement, categorized into immediate improvements and long-term research directions. For immediate improvements, focus should be placed on refining the chatbot's ability to provide granularly accurate information. This involves continuously optimizing prompt engineering to better guide the Large Language Model (LLM) in handling complex admission queries and significantly expanding the structured database with more specific details, such as program-specific nuances and detailed O-Level subject combinations. Crucially, developing robust error handling and fallback mechanisms is essential, ensuring that when the chatbot can't confidently answer, it either guides the user more effectively or directs them to alternative official resources. From a usability standpoint, implementing an automatic chat titling feature that intelligently suggests conversation titles, combined with the ability for users to manually edit these titles, will greatly enhance chat organization. Furthermore, while Google Login is convenient, exploring alternative login options like email/password registration will offer greater flexibility for diverse users. Finally, establishing a clear protocol for regular updates to the knowledge base is paramount to maintaining the chatbot's accuracy.

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