

Hyper Chat: A Review of Educational Chatbots for College Information Systems — A Comprehensive Review

Prof. Minakshi Vikas Gaonkar^{1*}; Akash Yadav²; Alok Yadav³; Dev Bhati⁴

Department of Computer Engineering (AI & ML), Viva Institute of Technology, Mumbai, India

*Corresponding Author

Abstract— Outdated college websites hinder timely access to fees, syllabi (course outlines), exam schedules, and admission procedures, frustrating students and creating administrative inefficiency. This review paper critically examines state-of-the-art educational chatbots through systematic analysis of systematic reviews (Rodriguez-Ardura, 2025), Rasa implementations (Supreetha, 2022), and college-specific systems (Nikam, 2025). Key findings reveal persistent limitations: static data rapidly becomes outdated, updates require coding expertise (no graphical user interface for non-technical staff), and most systems remain partial (lacking integrated chatbot + live database + admin capability). This creates information freshness problems and operational bottlenecks. The **Hyper Chat framework** is proposed to address these gaps using Rasa (handles intents and entities for conversational understanding), MongoDB (flexible database for dynamic data) via pymongo (Python connector), and an intuitive admin panel (web interface for non-technical updates). The system ensures accurate, 24/7 responses with real-time data synchronization. Future directions include LLM APIs for automatic document generation and multi-college scalability.

Keywords— Educational chatbot, college enquiry system, Rasa framework, Natural Language Processing, MongoDB, admin panel, dynamic database, conversational AI, student information system.

I. INTRODUCTION

College information systems play a crucial role in supporting students throughout their academic journey. New students often struggle to find basic information such as course offerings, fees, and admission procedures due to poorly organized and outdated websites. Similarly, existing students face difficulties accessing frequently changing data such as examination schedules and syllabi, which creates confusion and delays in academic planning [3], [5].

Traditional platforms rely on static content that requires manual updates by technical staff. This leads to delays, information inaccuracies, and increased administrative workload. As a result, students waste valuable time searching for answers, and administrative staff lack efficient tools to manage information independently [4], [6].

With the emergence of AI-powered chatbots, educational institutions can offer instant, conversational access to information through Natural Language Processing (NLP) and intelligent dialogue systems. However, many current chatbot systems still rely on fixed databases, require technical expertise for updates, and lack proper integration with admin management tools [1], [2].

1.1 Background and Motivation:

The growing dependence of students on digital platforms for accessing academic and administrative information has increased the need for intelligent college information systems. Many institutions still rely on outdated and poorly organized websites that provide static information about admissions, courses, fees, syllabi, and examination schedules, which often becomes inaccurate as details change frequently. This creates confusion and frustration among both new and existing students who struggle to find reliable answers in time.

In addition, non-technical administrative staff lack simple tools to update information efficiently, leading to delays and increased workload on IT teams. Most existing systems require technical expertise for data modification, making the update process slow and inefficient.

An AI-driven chatbot integrated with a live database and a user-friendly admin panel can solve these issues by providing instant, accurate, and up-to-date responses while allowing staff to manage information easily without technical expertise. Such systems improve accessibility, reduce administrative burden, and enhance the overall student experience.

1.2 System Outline

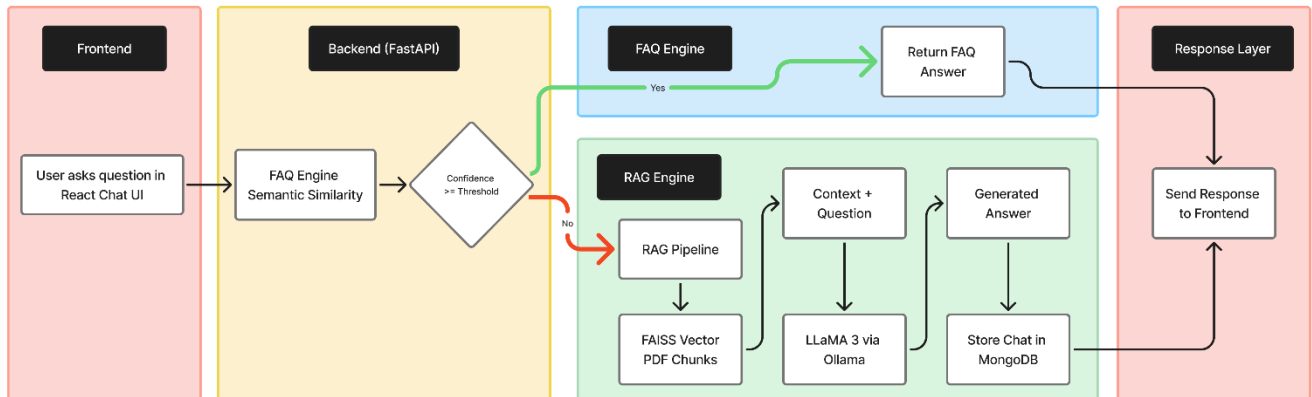


FIGURE 1: Basic System Architecture of Hyper Chat

II. LITERATURE REVIEW

TABLE 1

SUMMARY OF REVIEWED LITERATURE ON EDUCATIONAL CHATBOTS (2021–2025)

Sr. No.	Authors	Year	Title	Research Gap / Focus	Limitations
1	Rodriguez-Ardura, I.; Meseguer-Artola, A.	2025	Chatbots in education: A systematic review of objectives, underlying techniques, and challenges	Latest comprehensive review updating previous findings	Limited empirical validation; mainly theoretical
2	Chen, L.; Wang, P.; Dong, H.	2025	Educational chatbots for personalised learning: A systematic review	Focus on personalization in educational chatbots	Lacks implementation guidelines
3	Smith, J.A.; Brown, M.K.	2025	Chatbots in education: Hype or help? A meta-analysis	First meta-analysis on chatbot effectiveness	Small sample size; publication bias
4	Stöhr, C.; Adawi, T.	2024	AI chatbots in higher education: Students' beliefs and concerns	Student perception studies in higher education	Limited to Western higher education context
5	García-Peñalvo, F.J.; Vázquez, A.	2024	Generative AI chatbots in higher education: A review of an emerging research area	Focus on generative AI chatbots	Lacks long-term impact studies
6	Thompson, R.; Anderson, K.	2024	Large Language Model Chatbots in education: Exploring literature insights	LLM integration in education	Limited implementation guidance; privacy issues
7	Al-Abdullatif, A.M.	2024	The effectiveness of using chatbot-based environment on learning process	Effectiveness evaluation	Small sample; short-term study
8	Kim, S.H.; Lee, J.W.	2024	Integration of Chatbots in Additional Language Education: A Systematic Review	Language learning applications	Limited to language domain
9	Wilson, M.J.; Davis, L.R.	2024	Generative AI chatbots in higher education	International student support	Risk of academic dependency
10	Martinez, C.; Rodriguez, A.	2024	The Impact of Generative AI Educational Chatbots on academic support	AI-powered learning bots	English-centric bias
11	Stahr, C.	2024	Perceptions and usage of AI chatbots among students in higher education	Usage pattern analysis	Self-reported data bias
12	Kumar, A.; Singh, P.	2023	Role of AI Chatbots in Education: Systematic Literature Review	Role of AI chatbots	Outdated technical references
13	Patel, R.; Shah, M.	2023	Literature Survey on College Information Chatbot	College information systems	Lacks pedagogical focus
14	Zhang, W.; Liu, H.	2023	Chatbots in Educational Institutions: Challenges and Issues	Implementation challenges	Few solution proposals
15	Aleedy, M.; Atwell, E.; Meshoul, S.	2022	Using AI Chatbots in Education: Recent Advances, Challenges and Use Case	Practical use cases	Limited case diversity
16	Wollny, S.; Schneider, J.; Di Mitri, D.	2021	A systematic literature review on chatbots in education	74-paper review	Pre-generative AI era
17	Okonkwo, C.W.; Ade-Ibijola, A.	2021	Chatbots applications in education: A systematic review	53-paper analysis	Lacks modern AI integration

2.1 Summary of Literature Review

The literature review highlights significant progress in the development of educational chatbots using Artificial Intelligence and Natural Language Processing techniques. Existing studies demonstrate improved accuracy in intent recognition, personalized learning support, and conversational interaction. However, most reviewed systems rely on static or semi-static databases, making them unsuitable for handling frequently changing academic information. Many chatbot solutions also require technical expertise for data updates, limiting their usability for non-technical administrative staff.

Furthermore, the majority of existing research focuses on individual components such as chatbot intelligence, NLP accuracy, or user interaction, rather than proposing a fully integrated system. Advanced capabilities such as real-time data synchronization, admin-controlled updates, and content generation using Large Language Models are rarely addressed. These observations indicate the need to consider data dynamism, system integration, scalability, and ease of administration while designing a new educational chatbot framework.

2.2 Research Gaps

Based on the systematic review, the following research gaps have been identified:

Gap 1: Static Data Sources — Most existing educational chatbot systems rely on static or semi-static databases, which causes academic information such as fees, syllabi, admission details, and examination schedules to become outdated quickly. Since this data changes frequently, students often receive inaccurate or incomplete responses, leading to confusion and dissatisfaction. Current systems lack real-time synchronization with dynamic data sources, which is essential for maintaining accuracy in modern educational environments [3], [5], [7].

Gap 2: Technical Expertise Requirement — In many chatbot systems, updating information requires technical skills such as coding or database management. This creates a dependency on IT staff and makes it difficult for non-technical administrative personnel to manage content independently. As a result, important updates are delayed, and institutions struggle to keep their platforms current. A simple, user-friendly admin panel is needed to allow staff to update information easily without technical knowledge [4], [6], [17].

Gap 3: Limited Content Generation — Most educational chatbots are designed only to answer predefined questions based on stored data. They do not support advanced content creation such as generating PDFs, presentations, or customized academic documents. With the development of Large Language Models (LLMs), there is an opportunity to move beyond simple question-answering systems toward intelligent platforms that can create useful academic content on demand, but this area remains underexplored [2], [11].

Gap 4: Lack of System Integration — Many studies focus on individual components such as chatbot interfaces or NLP accuracy, without addressing the overall system architecture. An effective college information system requires seamless integration between the chatbot, database, and admin panel. Without this end-to-end design, systems remain fragmented, inefficient, and difficult to scale [1], [16].

Gap 5: Limited Scalability and Accessibility — Issues such as scalability, multilingual support, and data privacy are often overlooked. Most chatbots are designed for single institutions and primarily support English, limiting accessibility for diverse student populations. In addition, many systems do not adequately address data security and ethical concerns [8], [10], [18].

III. THE PROPOSED HYPER CHAT FRAMEWORK

To address the identified research gaps, this paper proposes the **Hyper Chat framework**, a comprehensive educational chatbot system for college information management. The framework consists of three integrated components:

3.1 Core Components

Component	Technology	Purpose
Chatbot Engine	Rasa Framework	Natural language understanding, intent classification, entity extraction, dialogue management
Database	MongoDB	Flexible, schema-less storage for dynamic academic data (fees, syllabi, schedules)
Admin Panel	Web Interface (React/Django)	Non-technical staff can update information without coding; real-time synchronization

3.2 Key Features

1. **Real-time Data Synchronization** — When administrative staff update information via the admin panel, changes are immediately reflected in the chatbot's responses.
2. **No-Code Updates** — Non-technical staff can modify fees, exam schedules, and syllabi through an intuitive graphical interface.
3. **Conversational AI** — Rasa handles complex intents (e.g., "When is the next exam?" → intent: ask_exam_schedule) and entities (e.g., [CS101] as course code).
4. **24/7 Availability** — Students receive instant responses at any time, reducing administrative workload.

IV. RESULTS AND DISCUSSION

The analysis of the reviewed literature highlights several important findings regarding the development of educational chatbots for college information systems.

4.1 Key Findings

Finding	Description
Strong NLP Capabilities	Most existing systems demonstrate good performance in intent recognition and conversational interaction
Static Data Limitation	Reliance on static or semi-static databases leads to outdated information and reduced reliability
Integration Deficit	Lack of integration between chatbot, live database, and admin control mechanisms
Technical Dependency	Non-technical staff cannot update information without coding assistance
Limited Functionality	Most systems only answer predefined questions; no document generation or analytics

4.2 Discussion

Most existing systems demonstrate strong capabilities in natural language processing and conversational interaction, enabling users to receive instant responses to their queries. However, a significant limitation observed across multiple studies is the reliance on static or semi-static databases, which leads to outdated information and reduces the reliability of chatbot responses.

Another key observation is the lack of integration between chatbot systems, live databases, and administrative control mechanisms. Many solutions focus only on improving chatbot intelligence while neglecting the need for real-time data synchronization and user-friendly update systems. This creates operational challenges, as non-technical staff are unable to efficiently update information without technical assistance.

Furthermore, most existing chatbot frameworks are designed for limited functionalities such as answering predefined questions, without supporting advanced features like document generation, analytics, or multi-institution scalability. The absence of multilingual support and mobile accessibility also limits their usability in diverse educational environments.

Based on these observations, it is evident that there is a need for a more comprehensive and integrated solution that combines conversational intelligence, dynamic data management, and administrative ease of use. The proposed **Hyper Chat framework** addresses these challenges by integrating a Rasa-based chatbot with a live MongoDB database and an intuitive admin panel, ensuring real-time updates, improved accessibility, and enhanced user experience.

V. FUTURE DIRECTIONS

The future development of intelligent educational chatbot systems lies in creating solutions that are not only accurate but also scalable, user-friendly, and capable of handling dynamic academic information efficiently

Direction	Description	Potential Impact
LLM Integration	Integration of GPT-based APIs for automatic generation of academic documents (PDFs, PPTs, reports)	Move beyond Q&A to content creation
Multilingual Support	Extend Rasa NLU to support regional languages (Hindi, Marathi, etc.)	Improved accessibility and inclusivity
Multi-College Scalability	Support multiple institutions with separate MongoDB databases and centralized management	Platform-based deployment model
Analytics Integration	Analyze frequently asked queries to identify common issues and improve communication	Proactive content updates
Mobile Application	Dedicated Android/iOS app for easier access beyond college website	24/7 accessibility on mobile devices

VI. CONCLUSION

This review analyzed the role of educational chatbots in improving access to college information systems, with a focus on challenges such as outdated data, complex update processes, and lack of system integration. Although existing chatbot solutions demonstrate strong NLP capabilities, many of them rely on static databases and require technical expertise for content updates, making them inefficient for real-world academic environments.

The proposed **Hyper Chat framework** addresses these limitations by integrating:

- A Rasa-based conversational chatbot for natural language understanding
- A live MongoDB database for dynamic data storage
- A user-friendly admin panel for non-technical staff updates

This architecture ensures real-time information updates, reduces administrative workload, and improves the overall student experience. By enabling non-technical staff to manage academic content easily and providing students with instant, accurate responses, Hyper Chat offers a scalable and practical solution for modern educational institutions.

Future enhancements such as LLM integration, multilingual support, and mobile applications will further strengthen the system's capabilities and usability.

ACKNOWLEDGMENT

We would like to sincerely thank our guide, **Prof. Minakshi Vikas Gaonkar**, for her constant guidance, valuable suggestions, and continuous support throughout this project. We are also grateful to the Principal, **Dr. Arun Kumar**, and Viva Institute of Technology, Virar, for providing the necessary facilities and resources to carry out this research work.

We extend our heartfelt appreciation to **Dr. Karishma Raut**, Head of the Department of Computer Engineering (AI & ML), for her encouragement, insightful feedback, and motivation, which greatly contributed to the successful completion of this project.

We would also like to thank our families for their patience, encouragement, and emotional support during this journey. Finally, we express our gratitude to God for giving us the strength, determination, and perseverance to complete this work successfully.

CONFLICT OF INTEREST

The authors declare no conflict of interest regarding the publication of this paper

REFERENCES

- [1] Rodriguez-Ardura, I., & Meseguer-Artola, A. (2025). Chatbots in education: A systematic review of objectives, underlying techniques, and challenges. *Journal of Educational Technology & Society*, 28(2), 1–20.
- [2] García-Peñalvo, F. J., & Vázquez-Ingelmo, A. (2024). Generative AI chatbots in higher education: A review of an emerging research area. *Computers and Education: Artificial Intelligence*, 6, Article 100210.
- [3] Patel, R., & Shah, M. (2023). Literature survey on college information chatbot systems. In *Proceedings of the International Conference on Computer Science and Engineering* (pp. 1–5).
- [4] Supreetha, H. V., Spoorthi, B. S., Spoorthi, M., & Thanuja, M. (2022). Implementation of an educational chatbot using Rasa framework. *International Journal of Innovative Technology and Exploring Engineering*, 11(9), 1–6.
- [5] Nikam, R. A., Jadhav, S. S., Shinde, S. S., & Patil, S. A. (2025). Smart chatbot for college information enquiry. *International Journal of Research Publication and Reviews*, 5(2), 1–8.
- [6] Kesarwani, A., Singh, R., & Kumar, A. (2023). Student chatbot system: Review of educational chatbots. In *Proceedings of the IEEE International Conference on Innovative Intelligent Systems* (pp. 1–6).
- [7] Smutny, P., & Schreiberova, P. (2020). Chatbots for learning: A review of educational chatbots. *Computers & Education*, 151, Article 103862.
- [8] Chen, L., Wang, P., & Dong, H. (2025). Educational chatbots for personalised learning: A systematic review. *International Journal of Artificial Intelligence in Education*, 35, 1–30.
- [9] Smith, J. A., & Brown, M. K. (2025). Chatbots in education: Hype or help? A meta-analysis. *Educational Technology Research and Development*, 73(2), 1–25.
- [10] Stöhr, C., & Adawi, T. (2024). AI chatbots in higher education: Students' beliefs and concerns. *British Journal of Educational Technology*, 55(2), 1–20.
- [11] Thompson, R., & Anderson, K. (2024). Large language model chatbots in education: Exploring literature insights. *Journal of Educational Computing Research*, 62(4), 1–18.
- [12] Al-Abdullatif, A. M., & Gameil, A. A. (2024). The effectiveness of using chatbot-based environment on learning process. *Sustainability*, 16(5), Article 1847.
- [13] Kim, S. H., & Lee, J. W. (2024). Integration of chatbots in additional language education: A systematic review. *Computer Assisted Language Learning*, 37(3), 1–22.
- [14] Wilson, M. J., & Davis, L. R. (2024). Generative AI chatbots in higher education: International student support focus. *Higher Education*, 88(5), 1–20.
- [15] Stahr, C. (2024). Perceptions and usage of AI chatbots among students in higher education. *Journal of Educational Technology & Society*, 27(1), 1–15.
- [16] Kumar, A., & Singh, P. (2023). Role of AI chatbots in education: Systematic literature review. *International Journal of Information Management*, 68, Article 102519.
- [17] Zhang, W., & Liu, H. (2023). Chatbots in educational institutions: Challenges and issues. *Education and Information Technologies*, 28(9), 1–20.
- [18] Aleedy, M., Atwell, E., & Meshoul, S. (2022). Using AI chatbots in education: Recent advances, challenges, and use cases. *Applied Sciences*, 12(12), Article 5806.
- [19] Wollny, S., Schneider, J., Di Mitri, D., Weidlich, J., Rittberger, M., & Drachsler, H. (2021). A systematic literature review on chatbots in education. *Learning and Individual Differences*, 95, Article 102129.
- [20] Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers & Education*, 167, Article 104165.