International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 12 | Dec - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

AI Powered Study Assistant

Dr.K.E. Kannammal[1], Ancy Jemi Goldbell P[2], Anishka J[3], Balaji S[4], Balaji S S[5] , Bharath Sivanesh S[6]

[1]*Professor and Head of the Department of Computer Science & Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India,*

[2]*Student, Department of Computer Science & Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India, Email: ancyjemigoldbellp22cse@srishakthi.ac.in*

[3]*Student, Department of Computer Science & Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India, Email: anishkaj22cse@srishakthi.ac.in*

[4]*Student, Department of Computer Science & Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India, Email: balajis22cse@srishakthi.ac.in*

[5]*Student, Department of Computer Science & Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India, Email: balajiss22cse@srishakthi.ac.in*

[6]*Student, Department of Computer Science & Engineering, Sri Shakthi Institute of Engineering and Technology, Coimbatore, Tamil Nadu, India, Email: bharathsivaneshs22csesrishakthi.ac.in*

ABSTRACT : *The system integrates a web-based teacher dashboard and a mobile student application for seamless interaction. A transformer-based Large Language Model (Gemini) is used for syllabus-driven question and answer generation. Teachers can upload syllabi, generate assessments, manage student doubts, and view analytics. Students access AI-generated materials and receive instant academic support through an AI chatbot. The backend is implemented using FastAPI with cloud-based storage and real-time synchronization via Firestore. Firebase Cloud Messaging enables real-time notifications. The system reduces teacher workload and improves response efficiency. Learning analytics support data-driven instructional decisions. Overall, the platform delivers a scalable and intelligent academic support solution.*

I. INTRODUCTION

The AI-Powered Study Assistant is developed to bridge this gap by providing an intelligent and collaborative academic environment for both teachers and students. It automates key academic activities such as question generation, answer creation, and doubt clarification through an integrated AI model. The platform offers two user-friendly interfaces — a web-based dashboard for teachers and a mobile application for students — both seamlessly connected through a cloud database. the integration of technology in education has become essential to improve teaching efficiency and student engagement. Despite the availability of various online learning platforms, teachers still spend a significant amount of time manually preparing study materials, generating question papers, and addressing student queries. These conventional methods often lack automation, consume time, and fail to provide immediate learning support for students.

II. LITERATURE REVIEW

Moulieswaran N, Prasantha Kumar N S. "Google Assistant Assisted Language Learning (GAALL): ESL Learners' Perception and Problems Towards AI-powered Google Assistant-Assisted English Language Learning", STUDIES IN MEDIA AND COMMUNICATION, 2023.

This research investigates ESL learners' perceptions, usability challenges, and effectiveness

of Google Assistant–assisted language learning. Through surveys and learner feedback, the authors evaluate how AI-powered assistants support informal learning, learner autonomy, and continuous practice outside classroom settings. The study reports positive learner attitudes toward AI-based assistance due to its accessibility and immediate feedback mechanisms. However, the paper also identifies challenges such as inaccuracies in AI responses, limited contextual understanding, and technological barriers among learners. The authors stress the importance of structured educational integration and teacher oversight to ensure learning effectiveness. The relevance of this study to the proposed system lies in its emphasis on learner perception and AI-assisted interaction. The proposed AI-powered study assistant similarly integrates conversational AI for doubt clarification while maintaining teacher supervision through a dashboard.

A. Holmes, B. Bialik, C. Fadel. "Artificial Intelligence in Education: Promises and Implications for Teaching and Learning", CENTER FOR CURRICULUM REDESIGN, 2022.

This study provides a comprehensive overview of how artificial intelligence can transform teaching and learning processes by supporting personalization, automation, and data-driven decision-making. The authors discuss AI applications such as intelligent tutoring systems, automated assessment, learning analytics, and conversational assistants. The paper emphasizes that AI should augment teachers rather than replace them, highlighting the importance of human oversight, transparency, and curriculum alignment.

Zawacki-Richter O, Marín VI, Bond M, Gouverneur F. "Systematic Review of Research on Artificial Intelligence Applications in Higher Education", INTERNATIONAL JOURNAL OF EDUCATIONAL TECHNOLOGY IN HIGHER EDUCATION, 2019.

This systematic review analyzes existing research on AI applications in higher education, including chatbots, adaptive learning systems, and learning analytics. The authors identify key benefits such as personalized learning support, improved student engagement, and reduced administrative workload for instructors. However, the study also highlights challenges related to transparency, data privacy, and limited pedagogical integration. These findings are highly relevant to the proposed system, which addresses these concerns by incorporating syllabus-based content control, role-based authentication, and analytics-driven monitoring. The review provides strong evidence for the feasibility and necessity of AI-assisted learning platforms in modern education.

Farhan Aslam. "The Impact of Artificial Intelligence on Chatbot Technology: A Study on The Current Advancements and Leading Innovations", EUROPEAN JOURNAL OF TECHNOLOGY, 2023.

This paper explores recent advancements in AI-driven chatbot technologies, focusing on Natural Language Processing, machine learning models, and conversational intelligence. The author examines how modern chatbots have evolved from rule-based systems to context-aware, generative AI models capable of handling complex queries. The study highlights applications of chatbots in education, healthcare, and customer service. The research identifies key benefits such as scalability, instant response generation, and user personalization, while also discussing limitations related to bias, hallucination, and lack of deep reasoning.

M. Samonte, Jaden Gabriel M. Escarillo, Kenneth Go, Nicole Benedict A. Landrito, Jasleen K Randhawa."Determining The Trust Level of Senior High School Associated with The Use of AI-Powered Digital Assistants", PROCEEDINGS OF THE 2023 6TH INTERNATIONAL CONFERENCE ON ..., 2023.

This conference paper evaluates student trust and acceptance of AI-powered digital assistants in educational environments. Using empirical

methods, the authors measure how reliability, response accuracy, and transparency influence student confidence in AI systems. The findings indicate that students are more likely to trust AI assistants when responses are academically aligned and consistent.

III. EXISTING SYSTEM

The existing systems for student learning and academic assistance largely rely on traditional and manual methods. Students often depend on conventional study materials such as printed notes, textbooks, and unstructured online resources for their exam preparation. While online educational platforms exist, they are often generic and fail to adapt to an individual learner's needs.

Most available systems lack intelligent recommendation mechanisms that can personalize study materials, quizzes, or learning plans based on a student's academic progress, performance, or subject difficulty level. This one-size-fits-all approach leads to inefficiency in learning and limited student engagement.In traditional setups, students are required to manually search for notes, question papers, and tutorials across multiple sources, which consumes significant time and effort.

Teachers and mentors must also handle academic guidance manually through physical meetings or group sessions, which are not scalable and lack real-time feedback capabilities. These systems also fail to analyze a student's performance data to identify weak areas or suggest targeted improvements. Communication between students and academic resources remains static and non-interactive. Furthermore, most existing digital tools used for study management do not incorporate artificial intelligence or data-driven learning insights. They do not provide instant doubt clarification, personalized recommendations, or adaptive . The absence of automation and intelligent analysis limits their effectiveness in guiding students dynamically based on their learning behavior. Additionally, such systems do not support integration across multiple platforms, resulting in fragmented user experiences.

IV. PROPOSED SYSTEM

In the AI-Powered Study Assistant, Google Gemini (Gemini 2.5 API) is used as the core Large Language Model (LLM) to perform intelligent academic processing. Gemini is a Transformer-based generative AI model developed by Google, designed to understand, reason, and generate human-like text using advanced natural language processing techniques. In the proposed system, Gemini functions as the intelligence layer that powers question generation, answer creation, and conversational academic support.

When a teacher uploads a syllabus document, the backend system sends the extracted syllabus text to the Gemini model through secure API calls. Gemini analyzes the content to identify key topics, learning objectives, and important concepts. Based on this understanding, it automatically generates syllabus-aligned academic questions and contextually accurate answers. This eliminates the need for manual question paper preparation and ensures consistency with curriculum requirements.

For student interactions, Gemini processes natural language queries submitted through the mobile application. It understands the intent and context of the question using self-attention mechanisms and generates clear, structured explanations or answers. If required, the response is routed to the teacher for validation, ensuring a human-in-the-loop approach. Gemini also assists in suggesting study guidance and clarifying concepts, enabling continuous learning support beyond classroom hours. Gemini plays a key role in maintaining academic relevance and response quality.

The model generates outputs strictly based on syllabus-driven prompts provided by the system, preventing unrelated or misleading responses. Its probabilistic token prediction mechanism ensures fluent and coherent explanations, while teacher-defined constraints guide the model to stay within educational boundaries. Gemini acts as an intelligent academic assistant rather than an

autonomous decision-maker. By combining Gemini's generative capabilities with teacher supervision, analytics monitoring, and syllabus control, the proposed system achieves a balance between automation, accuracy, and pedagogical integrity.

V.IMPLEMENTATION

A) FIGMA: Figma was used as the primary design and prototyping tool during the initial stage of system development. It served as a collaborative platform for creating the User Interface (UI) and User Experience (UX) designs for both the web dashboard and mobile application. The design team used Figma to develop wireframes, navigation flows, and component layouts that visually represented the final product.

B) REACT.JS : React.js was used to build the web-based teacher dashboard, which serves as the central control panel for teachers. It provides functionalities such as syllabus upload, AI-based question generation, student doubt management, and content analytics. React.js enables component-based development, allowing modular and reusable UI elements, which ensures scalability and maintainability. The use of Material-UI enhanced the visual appeal and responsiveness of the dashboard.

C) REACT NATIVE : The AI powered mobile application for students was developed using React Native, allowing the team to build cross-platform applications for both Android and iOS using a single JavaScript codebase. This unified development approach significantly reduced build time and ensured consistent performance across devices.

React Native's Fast Refresh feature streamlined debugging and live UI updates during development, while its native module integration allowed deeper hardware-level functionality where needed.

D) FIREBASE : Firebase provides a unified cloud-based ecosystem that includes services such as Cloud Firestore (database), Firebase Authentication, Firebase Cloud Messaging (FCM), and Firebase Hosting. These services work together to handle various aspects of application development—from user management and data storage to communication and deployment.

E) FASTAPI : FastAPI, a modern Python-based web framework, powers the backend of the AI-Powered Study Assistant. FastAPI was chosen for its high performance, asynchronous support, and automatic data validation using Pydantic models. It efficiently manages routes for syllabus uploads, AI-generated content retrieval, and student-teacher interactions. Integration with Firebase Auth ensures secure role-based authentication for teachers and students. Additionally, FastAPI's compatibility with Python's machine learning ecosystem makes it ideal for integrating the Gemini API and other AI models seamlessly.

VI.FLOW DIAGRAM

The diagram illustrates the overall working flow of the AI-Powered Study Assistant, which integrates artificial intelligence, cloud storage, and real-time communication. Teachers use the web dashboard to upload syllabi, generate AI-based questions and answers, and manage student doubts. The uploaded data is securely stored in the Firestore database, which ensures real-time synchronization with the React Native mobile application used by students.

VII.CONCLUSION AND FUTURE WORK

The AI-Powered Study Assistant represents a significant step toward modernizing academic processes through the integration of artificial intelligence and cloud-based technologies. The platform provides a unified environment where teachers can seamlessly manage academic content and interact with students through a secure and intelligent system. Students benefit from instant access to AI-generated learning materials,real-time responses to their queries queries, and personalized study recommendations.

Advanced Predictive Analytics : Incorporating machine learning models for predictive analysis will help identify learning gaps, forecast academic performance, and support proactive teacher intervention

Enhanced Analytics and Prediction System:Advanced analytics dashboards can be implemented to predict student performance trends using machine learning models. Predictive insights can alert teachers about students who may require academic assistance, enabling proactive guidance and personalized learning strategies.

VI. REFERENCES

[1] Moulieswaran N, Prasantha Kumar N S. "Google Assistant Assisted Language Learning (GAALL): ESL Learners' Perception and Problems Towards AI-powered Google Assistant-Assisted English Language Learning", STUDIES IN MEDIA AND COMMUNICATION, 2023.

[2] Farhan Aslam. "The Impact of Artificial Intelligence on Chatbot Technology: A Study on The Current Advancements and Leading Innovations", EUROPEAN JOURNAL OF TECHNOLOGY, 2023.

[3] M. Samonte, Jaden Gabriel M. Escarillo, Kenneth Go, Nicole Benedict A. Landrito, Jasleen K Randhawa. "Determining The Trust Level of Senior High School Associated with The Use of AI-Powered Digital Assistants", PROCEEDINGS OF THE 2023 6TH INTERNATIONAL CONFERENCE ON ..., 2023.

[4] Vasyl Kovalchuk, Svitlana Reva, Iryna Volch, Svitlana Shcherbyna, Halyna Mykhailyshyn, Tetiana Lychova. "ARTIFICIAL INTELLIGENCE AS AN EFFECTIVE TOOL FOR PERSONALIZED LEARNING IN MODERN EDUCATION", ENVIRONMENT. TECHNOLOGY. RESOURCES. 2025.

[5] Shreyaskar D P, Shashank V. Uday D, Sangangouda Gouda, Ramya H. "AI – Powered Study Assistant", INTERNATIONAL JPURNAL FOR MULTIDISCIPLINARY RESEARCH, 2025.