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NEXTLEARN: SMART STUDY APP

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ABSTRACT :

`The NextLearn Smart Study App is an integrated educational platform designed to organize academic resources and support students' day-to-day learning activities. The application brings together syllabus materials, academic references, previous-year question papers, online tests, educational video recommendations, study planning, task management, and AI-assisted doubt solving. Built with Flutter [1] for the user interface, the system uses FastAPI for backend processing, Supabase [4] with PostgreSQL [3] for structured data management, Firebase [3] Authentication for user sign-in, and the Gemini API [3] for chatbot responses. The video recommendation component retrieves topic-related educational content and ranks candidate videos using topic relevance and available popularity indicators, including views and likes. Unlike systems that require a fixed recommendation training dataset, this feature can use subject selections and search queries to retrieve current video information. The report describes functional testing and outlines accuracy and runtime evaluation methods; however, quantitative performance claims require recorded measurements under consistent test conditions. This paper presents the system design, principal modules, implementation technologies, and evaluation considerations for a unified student-oriented learning environment.

Keywords: NextLearn, Smart Study App, Adaptive Learning, Educational Video Recommendation, Artificial Intelligence, Study Planner, FastAPI Flutter [1], Supabase [4].

1. Introduction

Digital learning has become an important part of modern education, as students increasingly use online notes, recorded lectures, quizzes, and mobile applications for academic preparation. However, learning resources are often distributed across separate platforms, making it difficult to organize study tasks and identify suitable material. Students may spend additional time searching for topic-specific videos, locating previous-year question papers, planning revision, and finding explanations for difficult concepts. These challenges can interrupt independent study and make preparation less structured. To address these challenges, NextLearn provides a common digital environment that brings academic resources and study-support features together. The application combines syllabus access, references, previous-year questions, online tests, educational video recommendations, a study planner, task management, progress-related features, and an AI chatbot. Its main contribution is the integration of these functions through a student-oriented interface, supported by Flutter [1], FastAPI, Supabase [4], PostgreSQL [3], Firebase [3] Authentication, and the Gemini API [3]. The design aims to reduce unnecessary switching between tools and make common study activities easier to access.

- An integrated academic resource module provides access to syllabus documents, references, and available previous-year question papers.
- A topic-based educational video recommendation component ranks candidate videos using relevance and available popularity information, such as views and likes.
- Study-support functions, including tests, a planner, to-do tasks, streak tracking, and performance-related views, help students organize academic activities.
- An AI chatbot supported by the Gemini API [3] offers conversational explanations, while evaluation procedures consider functional behaviour, relevance, response time, and error handling

The remainder of this paper is organized as follows. Section 2 reviews related learning systems and technologies. Section 3 describes the proposed system and workflow. Section 4 discusses implementation and technology choices, Section 5 presents results and evaluation considerations, and Section 6 concludes the paper and outlines future scope.

2. LITERATURE SURVEY

Digital learning platforms provide access to courses, lectures, reading materials, assignments, and assessments. Learning management systems can organize formal course content, but students may still rely on separate applications for educational video discovery, personal study planning, practice questions, and AI-based doubt solving. Using multiple tools can fragment the learning process and require students to move repeatedly between interfaces. NextLearn follows the digital-learning approach while emphasizing the integration of several study-support functions in a single application.

Educational recommendation systems help users discover relevant resources from large collections of available content. Content-based methods use item characteristics and the user's query, collaborative approaches use patterns across users, and hybrid systems combine multiple signals. In NextLearn, candidate educational videos are retrieved for a selected subject or topic and ranked using topic relevance and available popularity indicators, including views and likes. These signals can help organize results, although popularity does not necessarily represent syllabus alignment, teaching quality, or learning effectiveness.

AI-based educational assistants can provide natural-language explanations and help students explore concepts interactively. Generative AI can make study support more accessible, but responses may be incomplete or inaccurate and should be checked against reliable academic resources. NextLearn integrates the Gemini API [3] to provide chatbot-based assistance within the application. The chatbot is intended as a supplementary learning aid rather than a replacement for textbooks, instructors, or verified course material.

Digital planning and assessment tools support task organization, practice, and progress review. Study planners can help students divide their preparation into manageable activities, while online tests and performance summaries can provide feedback on recorded work. The usefulness of these tools depends on the quality of implementation and the consistency of user activity records. NextLearn combines a planner and to-do functionality with educational resources, tests, video recommendations, and chatbot support to provide a more unified study workflow.

3. Proposed System

3.1. System Overview and Architecture Flow

NextLearn follows a modular client-and-managed-services architecture. The Flutter [1] interface accepts student actions such as selecting a subject, searching for a learning topic, opening study material, attempting a test, or asking a question. Requests requiring backend processing are handled by FastAPI, which validates inputs and coordinates the relevant application logic. Supabase [4] with PostgreSQL [5] provides

Structured data storage, while Firebase [3] Authentication [3] manages the configured sign-in process. For video discovery, the application uses the configured YouTube Data API [7] integration to retrieve available metadata and rank relevant results. Chatbot requests are sent to the Gemini API [6], and the returned response is displayed in the application. The exact behaviour of each feature depends on its implemented service integration.

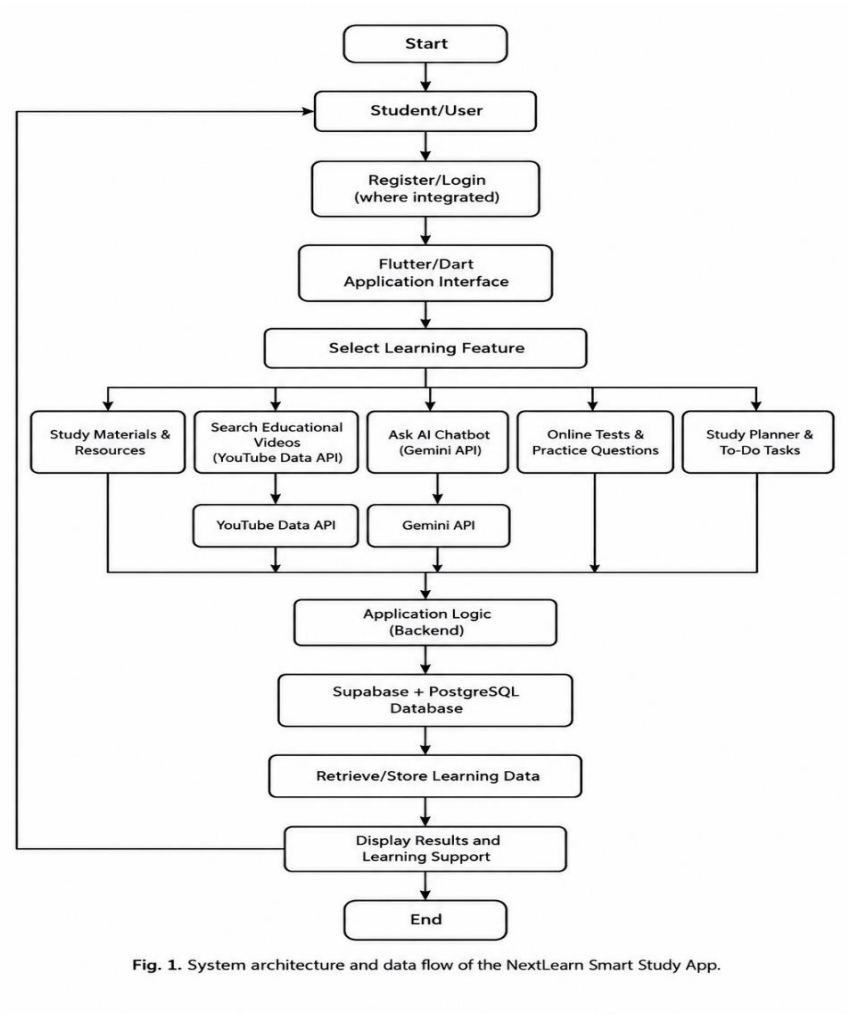


Fig. 1. System architecture and data flow of the NextLearn Smart Study App.

Fig. 1 - Sequential data flow and system architecture pipeline of NextLearn.

3.2 NextLearn Architecture System

The system organizes learning functionality into connected modules while keeping their responsibilities distinct. Academic resources provide access to syllabus documents, references, and previous-year question papers. The video recommendation module obtains candidate content for a subject or search query and orders results using topic relevance and available view and like information. The study planner and to-do module support the organization of academic tasks, while tests and performance-related screens help students review recorded activity. The chatbot module sends supported questions to the Gemini API [3] and presents the returned response. Supabase [4] and PostgreSQL [3] store structured application records, and Firebase [3] Authentication supports user identity management. Input validation and suitable error messages are important when external services or network requests fail.

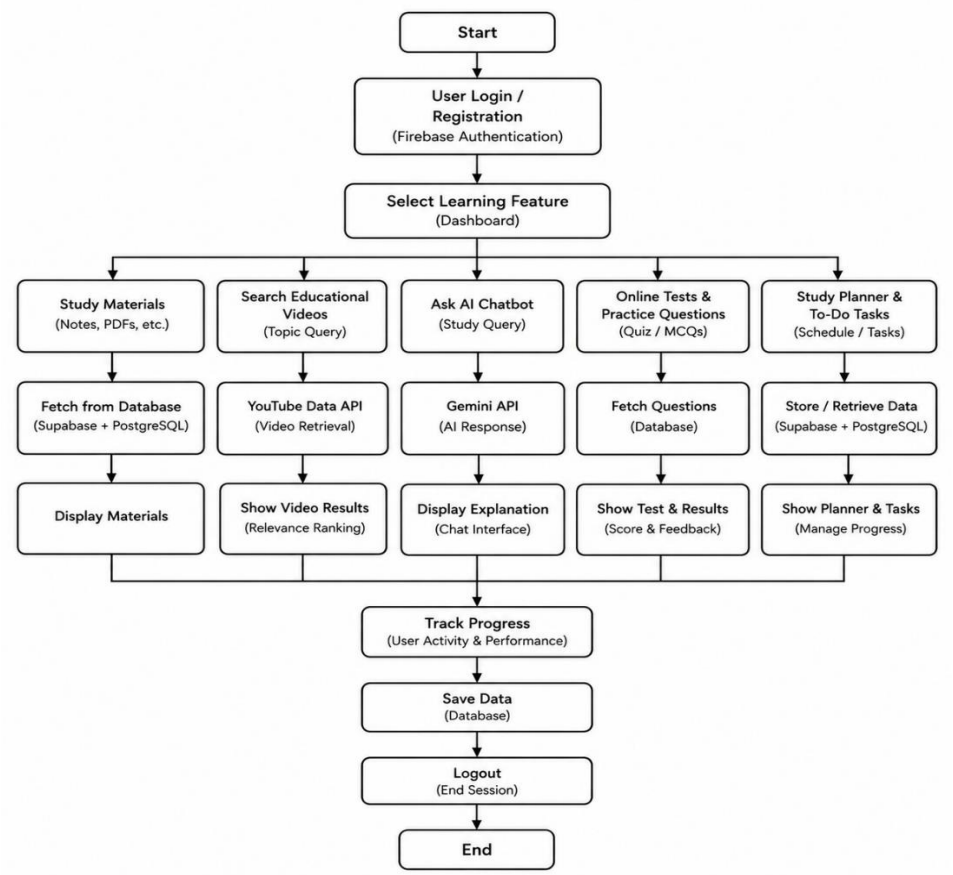


Fig. 2. Workflow diagram of the NextLearn Smart Study App.

Fig. 2 NextLearn System Workflow Diagram

4. SYSTEM IMPLEMENTATION AND TECHNOLOGY STACK

The implementation of NextLearn uses a modular application structure to provide academic resources, study organization, educational video discovery, and AI-assisted learning. The frontend is developed with Flutter [1] and Dart [2] [2], allowing the user interface to be maintained through a shared codebase. FastAPI provides backend endpoints for supported requests and separates request processing from the presentation layer. The application integrates external services where required, including Firebase [3] Authentication [3], Supabase [4] [4], the YouTube Data API [3] [7], and the Gemini API [6]. This separation makes the major components easier to test and maintain.

Supabase [4] provides a managed PostgreSQL [5] database for structured application data, while Firebase [3] Authentication [3] handles the configured user sign-in flow. The video recommendation component uses subject or topic queries and available video metadata, including relevance, views, and likes, to organize results. The Gemini API [6] supports conversational study assistance. The report describes functional checks and proposes comparative relevance and runtime evaluation; numerical accuracy or latency improvements should only be stated when supported by measurements collected under documented and repeatable conditions.

5. Results and Discussion

The NextLearn Smart Study App brings several study-support functions into a common application interface. Users can access academic resources, retrieve educational videos, use chatbot assistance, and organize study activities through the implemented modules. The modular design separates interface presentation, backend processing, data storage, and external service communication. Functional checks can verify that subject queries are

processed, relevant video information is displayed, chatbot requests return responses when the service is available, and supported records are handled consistently. Screenshots provide evidence of the implemented interfaces, while claims about accuracy, response time, or improved academic outcomes require separate quantitative testing.

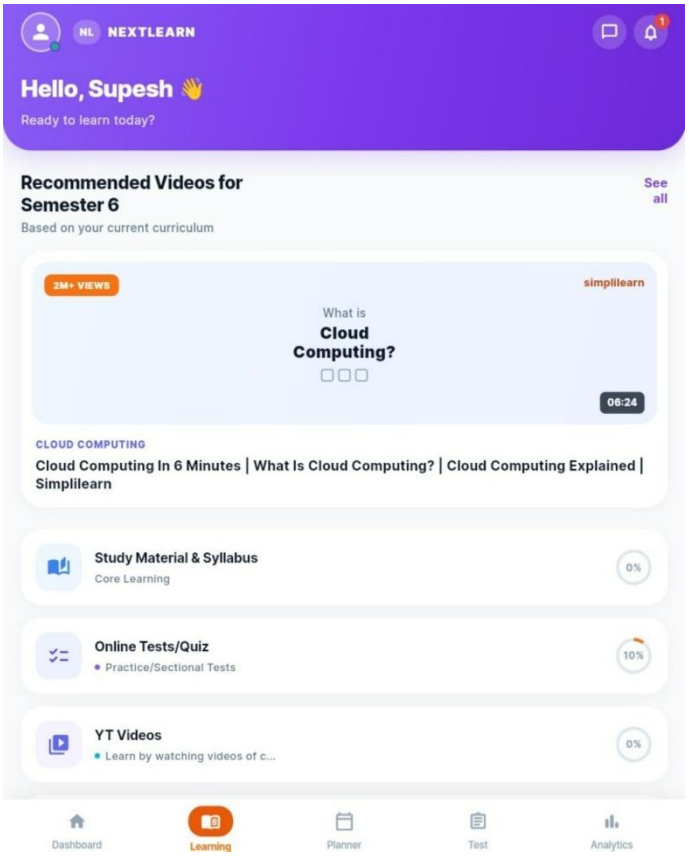


Fig. 3: NextLearn home page and student dashboard

The home page and dashboard serve as the primary entry points to the NextLearn Smart Study App, providing students with a centralized interface to access various study-support features. The dashboard is designed to organize the application's major modules, including study materials, subject selection, educational video recommendations, online tests, study planning, task management, and AI-based chatbot assistance. By presenting these features in a structured and accessible manner, the application allows students to navigate between different learning activities conveniently.

The interface aims to provide a simple and user-friendly experience by helping students locate the required academic resources without unnecessary complexity. Students can select subjects according to their learning requirements, explore educational videos, access study materials, attempt online assessments, and organize their daily study schedules. The availability of these features within a single platform reduces the need to switch between multiple applications for different academic activities. This centralized arrangement makes it easier for students to access learning resources and manage their study related tasks more efficiently.

Furthermore, the dashboard acts as a common navigation point that connects users to the different functionalities of the application. Its organized layout helps students understand the available features and choose the appropriate module based on their immediate learning needs. The integration of study planning and educational resources supports a more systematic approach to learning, while the AI chatbot provides an additional option for obtaining assistance with academic questions. Together, these features are intended to make the learning process more organized, accessible, and convenient.

The home page and dashboard are important components of the NextLearn Smart Study App because they influence how users interact with the overall system. A clear interface, properly arranged navigation options, and accessible modules can improve usability and help students move smoothly between different functionalities. The effectiveness of the dashboard also depends on the correct functioning of the connected backend services and the availability of the relevant application features. Therefore, the dashboard provides the foundation for accessing and using the major components of the NextLearn platform.

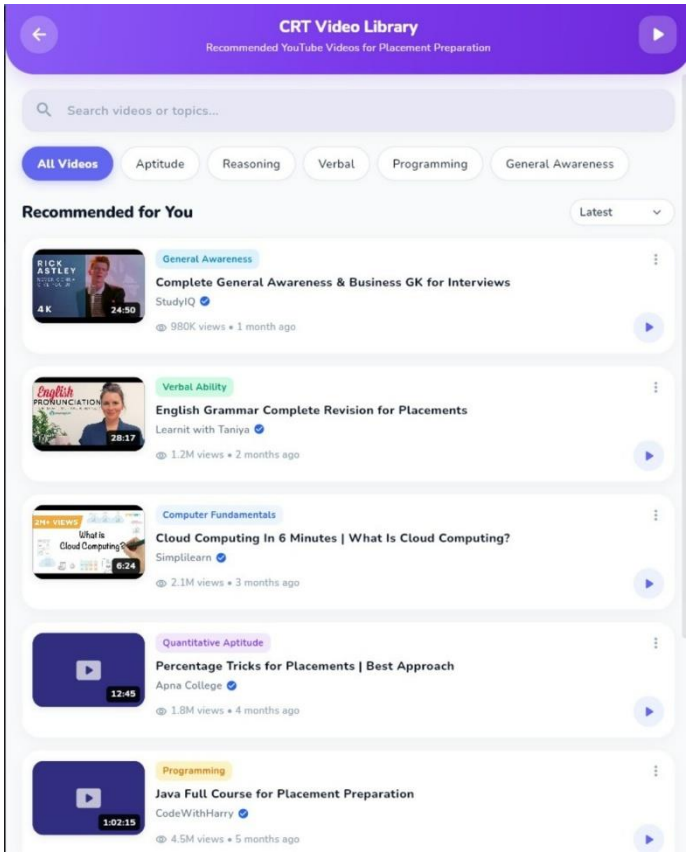


Fig. 4: Educational video recommendation and learning-resource interface.

The learning-resource interface of the NextLearn Smart Study App is designed to help students discover educational content according to their academic requirements and learning interests. Through this interface, students can select a subject or enter a topic-related query to find relevant educational videos. The system aims to simplify the process of searching for learning materials by presenting educational resources in an organized manner. Instead of manually searching across multiple platforms, students can use the application's video recommendation module to explore content related to their selected subjects and topics.

The video recommendation module retrieves educational video information and displays suitable results based on the user's search query. Candidate videos are ranked using topic relevance and available popularity indicators, such as the number of views and likes. Topic relevance helps identify videos associated with the requested subject, while popularity indicators can help distinguish content that has attracted greater viewer engagement. By considering these factors, the system attempts to present useful learning resources in a convenient order. However, popularity does not necessarily guarantee educational quality, accuracy, or suitability for every student.

6. Conclusion and Future Scope

This paper presented NextLearn, a Smart Study App designed to provide a unified environment for accessing academic resources and managing study activities. The application combines syllabus material, references, previous-year questions, tests, educational video recommendations, study planning, task management, and AI-assisted doubt solving. Its implementation uses Flutter [1], FastAPI, Supabase [4] with PostgreSQL [3], Firebase [3] Authentication, and the Gemini API [3] according to the supported module integrations. The video recommendation feature considers topic relevance and available popularity indicators to organize retrieved content. The system offers a practical foundation for bringing common learning activities together, while its effectiveness should be established through consistent functional tests, measured runtime observations, and student feedback.

Future work can improve the recommendation component through syllabus-aware matching, clearer relevance evaluation, and personalization based on permitted user preferences. The study planner can be extended with flexible scheduling, reminders, and progress-aware adjustments. Further development may add adaptive quizzes, improved learning analytics, accessibility options, multilingual content, and offline access to selected resources. Chatbot responses can be supported with verified course material and clearer safeguards against inaccurate answers. Evaluation with larger, documented test sets and feedback from students would help measure usability, recommendation relevance, response time, and the practical value of the application.

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