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A Smart Peer Learning Platform for Academic Support Using Senior–Junior Collaboration

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Abstract: *In many colleges, students often face difficulty in clearing their academic doubts on time. Most juniors hesitate to ask questions in class, and existing online resources do not always provide instant or personalized help. To address this issue, this work presents a peer-based learning platform that connects junior students with seniors and mentors in a structured and interactive way. The system allows users to post doubts, participate in discussions, and receive guidance through real-time communication. It also includes features like quizzes, performance tracking, and reward-based engagement to encourage active participation. Senior students contribute by sharing their knowledge and experiences, while juniors benefit from simplified explanations and quick responses. The platform creates a supportive academic environment where students learn collaboratively instead of relying only on traditional teaching methods. It not only improves understanding but also helps in developing communication, leadership, and problem-solving skills among users.*

Keywords: Peer Learning, Student Mentorship, Doubt Solving System, Collaborative Education, Real-Time Communication, Gamification, Academic Support Platform

I. INTRODUCTION

In today's education system, students are expected to learn quickly and understand concepts deeply. However, one common problem faced by many students is the delay in clearing their doubts. In classrooms, not every student feels comfortable asking questions. Some hesitate due to fear of judgment, while others may not get enough time or attention from instructors. Although many online learning platforms are available, most of them focus on one-way content delivery such as video lectures. These platforms do not provide immediate interaction or personalized support when a student is stuck on a topic. To overcome these limitations, a peer-supported learning approach can be highly effective. Senior students, who have already studied the same subjects, can guide juniors in a more relatable and practical manner. Based on this idea, the proposed system is designed as an interactive platform where students can connect, ask questions, and learn from each other. The platform encourages a collaborative learning culture where knowledge is shared openly. It reduces hesitation among students and promotes faster understanding through discussion, guidance, and real-time communication.

II. PROBLEM STATEMENT

Students often struggle to get timely help for their academic doubts. Traditional classroom environments and existing digital platforms do not always support instant and structured interaction. This leads to confusion, reduced confidence, and slower learning progress. There is a need for a system that allows students to communicate freely, ask questions without hesitation, and receive quick and reliable answers from peers and mentors.

III. OBJECTIVES

- To develop a platform for quick and easy doubt resolution .
- To encourage peer-to-peer learning among students .
- To provide real-time communication between juniors and seniors .

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- To improve student engagement using rewards and gamification .
- To include assessment tools like quizzes and performance tracking
- To create a supportive and collaborative academic environment

IV. LITERATURE REVIEW

Sankar, S., et al. (2025). AI-powered cloud e-learning.
Sankar and his team developed a cloud-based learning platform that allows students to solve doubts quickly with peer support. Their research highlights that faster doubt resolution helps students avoid confusion and improves their learning speed. This supports the idea of real-time academic interaction. [1]

Zhu, C., et al. (2024). AI-driven peer agents.
Zhu and colleagues introduced gamified learning using AI-based peer agents. Their study showed that features like points, rewards, and badges significantly increased student participation. More than 80% of students were actively involved due to these engaging elements. [2]

Sharma, V., et al. (2024). MERN Stack e-learning platform.
Sharma and his team designed a collaborative learning system using MERN stack technologies. Their work demonstrates that scalable web platforms can support large numbers of users and enable smooth communication among students, making peer learning more effective. [3]

Ballesteros, J. A., et al. (2024). Peer mentoring in engineering education.
Ballesteros and his team explored how senior students mentoring juniors can improve academic performance and confidence. Their results showed that both mentors and learners benefit, especially in communication skills and subject understanding. [4]

V. METHODOLOGY

The system is developed using modern web technologies to ensure performance and scalability.
• Frontend Development:
Designed using React and Tailwind CSS for a responsive and user-friendly interface.
• Backend Processing:
Implemented using Node.js and Express to manage application logic and communication.
• Database Management:
PostgreSQL with Supabase is used for secure and real-time data handling.
• Core Features Implemented:
o Doubt posting system
o Real-time chat and discussion forums
o Quiz and test modules
o Reward and engagement system
• Testing and Feedback:
The system was tested by students, and improvements were made based on usability feedback.

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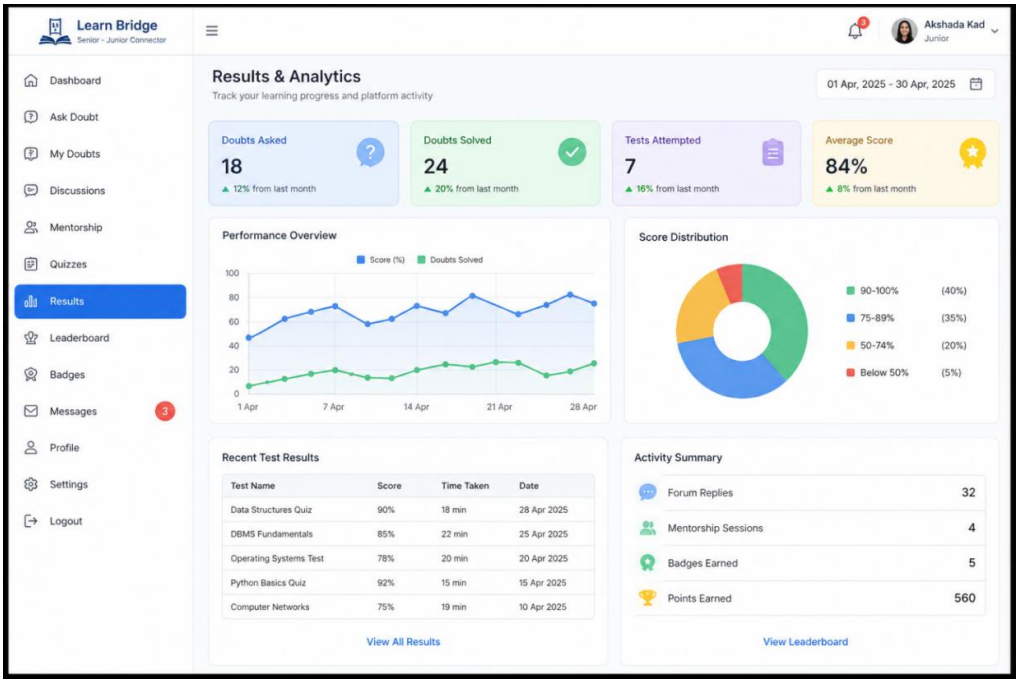
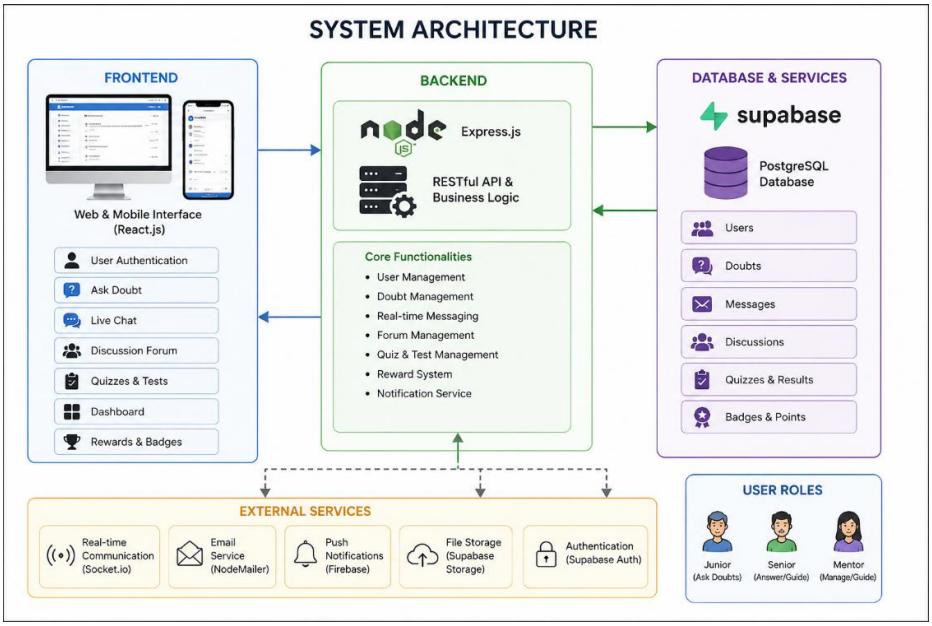
VI. RESULT



VII. SYSTEM ARCHITECTURE



The system follows a three-layer architecture consisting of frontend, backend, and database components.

Frontend Layer:

This is the user interface where students interact with the system. It includes features such as login, doubt posting, chat, and dashboards.

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Backend Layer:
The backend handles all the core logic, including user authentication, data processing, and communication between frontend and database.
Database Layer:
The database stores all essential data such as user profiles, questions, answers, and performance records. It also supports real-time updates for instant communication.
The overall workflow follows a structured path:
User → Frontend → Backend → Database → Response to User
This architecture ensures reliability, scalability, and smooth performance of the system.

VIII. BENEFITS TO SOCIETY

The system promotes equal learning opportunities by allowing every student to access help easily. It reduces hesitation and creates a friendly environment where students can learn without fear.
It also helps seniors develop important soft skills such as communication, mentoring, and leadership. Overall, it contributes to a more collaborative and supportive educational ecosystem.

IX. CONCLUSION

The proposed platform successfully bridges the gap between students by enabling real-time doubt solving and peer mentorship. It enhances learning efficiency and creates a more engaging academic environment.By combining technology with collaborative learning, the system improves both academic performance and student interaction.

X. FUTURE SCOPE

The system can be further improved by adding:
AI-based doubt suggestions
Video calling and live classes
Mobile application support
Advanced analytics and progress tracking
Integration with LMS systems
These enhancements will make the platform more powerful and widely usable.

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