International Journal of Innovative Research in Computer Science and Technology (IJIRCST)
ISSN (Online): 2347-5552, Volume-14, Issue-1, January 2026
DOI: https://doi.org/10.55524/ijircst.2026.14.1.8
Article ID IRP-1710, Pages 63-70
www.ijircst.org

Artificial Intelligence Powered Students Hub for Knowledge and Skills Share-A Review

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Received: 28 November 2025 Revised: 13 December 2025 Accepted: 27 December 2025

ABSTRACT- AI has gained significant traction in recent years as a potentially useful tool for resolving long-standing problems with student learning, particularly those related to engagement, practical skill development, and individualized support. Our experience creating the "AI Powered Students Hub," a web-based platform intended to enhance conventional teaching techniques, is discussed in this paper. Many of the methods used today have trouble with things like giving students immediate assistance outside of class or coming up with useful ways for them to learn from one another.

In order to provide students with immediate academic support, the Hub incorporates an intelligent chatbot. Additionally, we created a dynamic skill-sharing module that makes it simple for students to share their knowledge and skills. The platform includes activities that help users stay active over time. Users learn through discussion and by sharing their personal knowledge. The system works through joint effort rather than one-way communication. A notable aspect of the system is how intelligent assistance supports learning while collective knowledge within the community continues to grow naturally. All things considered, we view the Hub as a useful advancement in making education more responsive, collaborative, and effective at giving students the practical skills they will need for their future employment.

KEYWORDS- Gamification, Online Learning, Student Hub, Peer-to-Peer Learning, AI in Education, and Knowledge Sharing.

I. INTRODUCTION

Although digital education platforms have advanced significantly in recent years, new difficulties have emerged, particularly with regard to student engagement, personalization, and the capacity to manage collaborative learning. Peer-to-peer (P2P) models and artificial intelligence (AI) have emerged as technologies that may be able to address many of these problems by providing a customized and interactive method of managing skill exchange. In this paper, we present the "AI Powered Students Hub," a platform designed to address common problems in modern learning systems. These problems include inconsistent engagement, one-size-fits-all content, student isolation, and trouble locating timely peer support [1][10].

The fundamental characteristics of the Students Hub - collaboration, personalization, and engagement help create a self-sufficient community and maintain track of accomplishments. To assist students, we have implemented AI-driven chatbots and smart matchmaking algorithms. Additionally, we use gamification to apply learning incentives and automatically motivate students without requiring direct instructor intervention, which lowers dropout rates and increases retention [2][5].

Students are encouraged by the platform to make profiles of the skills they "offer" and "need." By avoiding passive, one-way learning, this arrangement not only increases engagement but also facilitates the provision of pertinent, in-the-moment peer support. This makes it suitable for self-paced online learning, university-wide integration, and hybrid classrooms [3][9]. Additionally, we have ensured that the Hub is user-friendly on all devices and has a simple interface for both mentors and students. It is specifically designed to address real-world issues that continue to impede digital education systems, such as low motivation and knowledge gaps [7][10].

In this work, we describe the development of the Students Hub and how it addresses some of the issues with conventional learning systems. These kinds of systems, in our opinion, can facilitate peer-to-peer collaboration, more efficient knowledge transfer, and improved engagement all around. Over time, they might hasten the transition to a decentralized and customized digital education [1].

II. RELATED WORK

The rapid growth of online education in recent years has drawn the interest of numerous researchers. It is because digital platforms have the potential to improve the efficiency, accessibility, and personalization of learning and skill sharing. Many technical and pedagogical aspects, such as how peer-to-peer (P2P) networks are constructed [1][2], how artificial intelligence (AI) can personalize the experience [5][6], and how gamification sustains student

engagement [7][8], have been extensively studied by academics. A solid foundation for creating intelligent, user-centric educational hubs has been established by this expanding body of work.

Peer-to-peer learning is the "next wave" of online education, according to one review by Chandra and Palvia [1]. In order to overcome the drawbacks of conventional, one-way online courses and promote a more dynamic, community-driven learning environment, they emphasize the significance of collaborative models.

Meena Sri et al. [2] took a closer look at platform design and suggested a particular platform for peer-to-peer skills and knowledge exchange. Their analysis clarifies how users can be categorized by proficiency levels using a skill assessment system, facilitating more efficient and smooth knowledge transfer.

Sofiya et al. [3] provided a comparative assessment of platform features, specifically focusing on a "skill swap" website that uses a matchmaking algorithm. Their analysis outlines the useful benefits of automatically determining complementary skill sets and user objectives, guiding the creation of an intelligent infrastructure for connection recommendations.

In terms of platform models, a non-monetary "Skill Share" platform was examined by Kale et al. [4]. They examined how eliminating financial transactions promotes involvement and teamwork in a variety of fields, including the creative arts, music, and coding. Crucially, they also emphasized the necessity of user rating systems and skill verification in order to foster community trust.

In this paper, Labadze et al. [5] conducted a thorough, systematic review of the literature to examine the role of AI chatbots in education. They emphasized the main advantages in their review, including instant assistance, explanations, and serving as virtual teaching assistants. The future scope, where AI helps teachers and students in a variety of ways, was also identified by the authors.

An improved MOOC platform called TSConnect was presented by Liu and Du [6] as a remedy for communication gaps frequently brought on by the "curse of knowledge." In order to promote a more connected and compassionate learning environment, this paper outlined the fundamental principles of utilizing dynamic knowledge graphs and artificial intelligence.

With a thorough meta-analysis on the efficacy of gamification in educational settings, Li et al. [7] furthered the conversation on user engagement. Although their study brought attention to implementation issues, it ultimately demonstrated that well-designed game elements can have a positive effect on learning outcomes and student motivation.

When it comes to specific applications, Mehrnoosh khoshnoodifar et al. [8] compared gamification with common e-learning approaches for teaching statistics. Their work looks at the trade-offs in instructional design and provides helpful guidance on what specific game elements, such as those in their "EGameFlow" model, improve both learning and student attitudes.

Chambers et al. [9] examined a Facebook-delivered learning program to gain insight into user perception in P2P environments. Through the identification of important themes in learners' and tutors' experiences with online peer-to-peer teaching, their qualitative study mapped out the acceptability of using social media platforms for medical education.

Teoh et al. [10] investigated student engagement in hybrid classrooms more broadly by contrasting in-person and virtual settings. They discovered that engagement can vary depending on the context, highlighting the necessity of platforms made to actively track and encourage positive student participation in any setting.

From P2P models and matchmaking algorithms to AI chatbots and gamification, these studies all highlight what makes an educational platform useful and interesting. Our work focuses on developing three key components using the knowledge we've gained from this literature: an integrated engagement tracking system, a personalized knowledge-sharing interface, and an AI-driven skill-matching engine. These together make up the central component of the intelligent student hub that we suggest.

III. PROBLEM STATEMENT

A one-size-fits-all curriculum and little student interaction are two of the practical issues that traditional online education systems are currently dealing with. These obstacles restrict collaborative flexibility and make it more difficult for students in hybrid environments and self-motivated learners to acquire practical skills. Knowledge gaps and demotivation will inevitably result from students' inability to readily seek out peers for assistance or from inconsistent engagement. This will therefore have an impact on skill development and overall learning outcomes. Such problems become significant barriers to a truly effective educational ecosystem. Real-time, unrestricted connections between students with complementary needs are essential for a learning hub to be truly effective. In addition to increasing teamwork, this type of arrangement will make learning more accessible and individualized. Additionally, it would bolster the student body and promote involvement. A system to create the next generation of intelligent, interactive, and captivating learning infrastructure is required to accomplish this. Then and only then will we be able to transition to an adaptable, peer-driven educational ecosystem.

The AI-powered Students Hub is a new and more intelligent system that uses its key features, such as peer-to-peer networking, AI matchmaking, and gamification, to provide an engaging, collaborative, and personalized learning environment in response to the current challenges of digital education. AI integration with the student hub can reduce learning friction, provide immediate assistance, and do away with the need for direct instructor intervention for frequently asked questions. Furthermore, skill-sharing modules and sophisticated matchmaking algorithms guarantee that students connect with the appropriate peers for their particular needs. The platform makes use of tools like gamified leaderboards and AI chatbots to enhance engagement, make progress tracking easier, and facilitate peer mentoring. When taken as a whole, these attributes demonstrate the hub's capacity to revolutionize digital learning by enhancing its effectiveness, personalization, and collaboration.

A. Objectives of the Proposed System

The following are the Objectives of the proposed project, each of which is aimed at addressing the current challenges and the existing gaps in the digital education through an AI-powered peer-to-peer platform:

- To Facilitate Peer-to-Peer Skill and Knowledge Exchange: To overcome the limitations of isolated learning in traditional online models, the proposed solution focuses on creating a dynamic center for sharing knowledge. This improvement allows students to take on dual roles: as learners and as mentors. It fosters collaborative problem-solving and lessens the reliance on traditional, formal instruction.
- To Enable Intelligent Matchmaking for Collaborative Learning: The proposed AI-driven infrastructure streamlines the process of identifying appropriate learning partners. By analyzing profiles in accordance with student-defined skill objectives and pre-existing expertise, the system facilitates peer connections. As a result, these connections are established more swiftly, with greater relevance and reliability, compared to manual search techniques, thereby promoting the development of substantive academic collaborations.
- To Boost Student Engagement and Active Motivation: The system will leverage refined gamification elements and AI-powered content suggestions to increase active involvement. This approach aims to maintain strong student engagement, even in hybrid or virtual environments. The goal is to make learning feel like a rewarding, interactive experience, a key factor in boosting knowledge retention and course completion.
- To Provide Personalized and On-Demand Support: Advanced AI chatbots and personalized dashboards are employed to accommodate varied student learning styles and tackle specific difficulties. These tools offer instant, round-the-clock responses to frequently asked questions, suggest pertinent resources tailored to each student's progress, and allow every learner to advance at their own speed, preventing anyone from falling behind.
- To Foster a Self-Sustained, Collaborative Community: To build a community-driven, scalable, and lasting platform, we'll provide powerful tools for peer skill verification, collaborative projects, and discussion forums. This approach encourages students to actively create, share, and validate knowledge at their own pace, fostering a self-sustaining ecosystem that grows and thrives through user contributions.

IV. METHODOLOGY

The development of the "AI-Powered Students Hub" follows a clear and robust framework designed to create a personalized and engaging peer-to-peer learning experience. Below are the key steps we use to bring the Student Hub's objectives to life.

A. Requirements and Platform Selection

The project's goals are clearly defined with a focus on high collaboration, engaging experiences, and intelligent personalization. Based on these needs, a suitable web platform is chosen (for example, MERN stack for the application and Python for the AI microservices).

B. Architecture and AI Model Design

The system is built with a layered microservices architecture to meet all objectives efficiently. AI models are designed to automate recommendations and connections using collaborative filtering and NLP techniques.

C. Security and Data Privacy Integration

Advanced security measures are implemented, including secure API endpoints, data encryption, and role-based access controls, to protect student data and ensure privacy. User authentication is also applied to keep the platform safe.

D. User Profile and Authentication Development

Student profiles are secured using OAuth (Google/GitHub) and two-factor authentication. The system enforces distinct user roles (e.g., student, mentor, admin) to maintain secure interactions.

E. AI Engine and Chatbot Integration

The main application communicates securely with AI microservices to ensure smooth data flow for matchmaking algorithms. An integrated AI chatbot provides on-demand support to users.

F. UI/UX and Gamification Design

The platform is designed to be simple and intuitive, offering a smooth, user-friendly interface. Engagement is boosted through gamification features like badges and points, all while keeping personal data protected.

G. Testing and Validation

The system undergoes thorough testing in different scenarios, including integration, security, and usability testing (UAT). AI model accuracy is benchmarked under varying load conditions to ensure reliability.

H. Deployment and Monitoring

The application is hosted on a secure cloud platform (e.g., Vercel) for high availability and data security. Continuous monitoring tracks real-time issues and engagement metrics, which are addressed promptly.

I. User Onboarding

Clear guides, tooltips, and learning resources help users understand how to navigate the Hub effectively, from finding peers to posting skills, encouraging active participation and boosting confidence.

V. SYSTEM DESIGN

Figure 1 shows the system architecture of the proposed AI-powered learning hub. It includes key components such as user interfaces, API interfaces, application microservices, and an intelligent AI engine. Together, these elements ensure seamless integration and deliver personalized information across the platform[6].

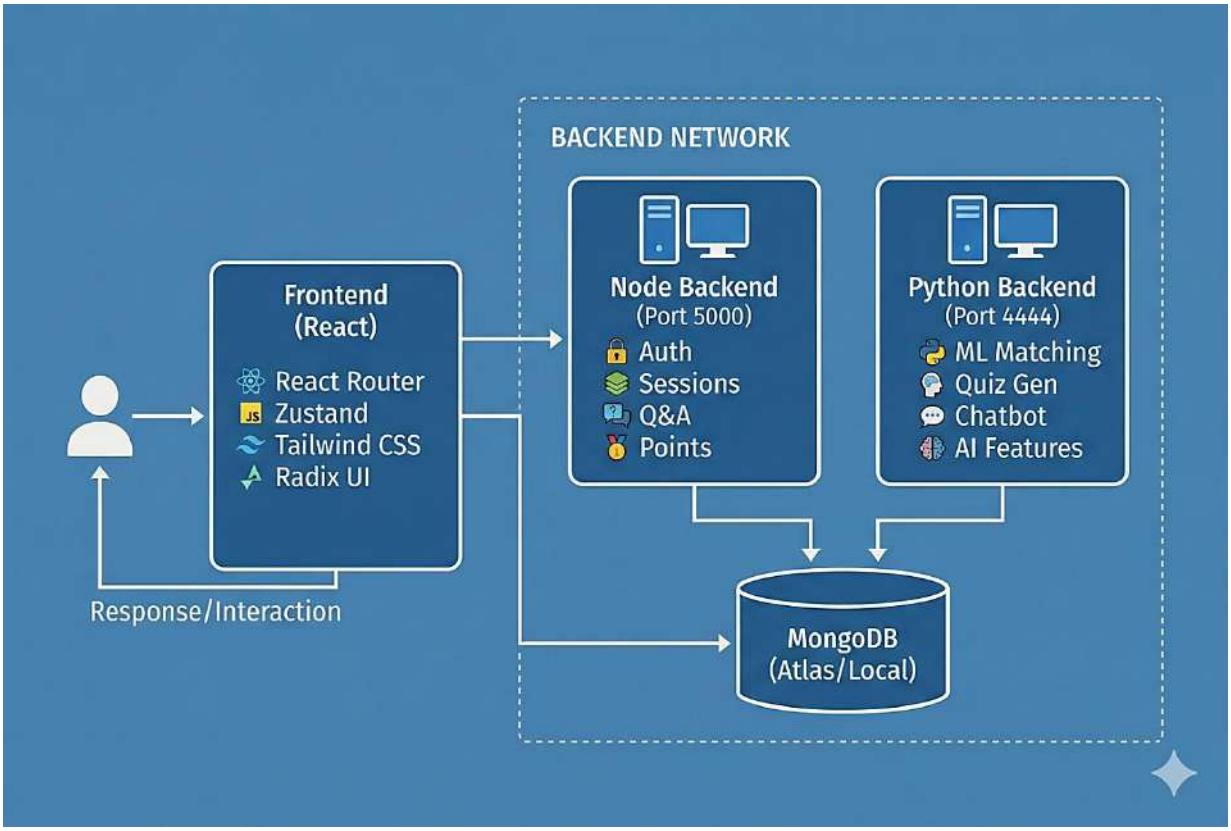

Figure 1: System Architecture of AI-Powered Students Hub

- User Layer (Students and Mentors): End users interact with the system through web or mobile interfaces. This layer includes students who request skills or ask questions, and peers acting as mentors. Each user has a secure, authenticated personal profile. Skill-share requests are initiated by users and sent to the application layer via APIs [2][3].
- Profile Management System: This subsystem manages student authentication, skill tracking, secure storage of achievements, and cryptographic signing of skill verifications. Profiles ensure secure user identification and data integrity using OAuth and role-based mechanisms. They also interact with AI models to deliver personalized recommendations [4].
- API Gateway Layer (REST/Web APIs): This layer provides endpoints for system integration. REST APIs handle application-level actions like posting questions or searching for skills, while Web APIs support user access, session management, and real-time updates like notifications and chat messages. It ensures security, scalability, and abstraction.
- Application and Integration Layer: Responsible for orchestrating communication between users and the AI engine, this layer includes microservices connecting core platform features such as "Skill Share" and "Knowledge Share." It manages user session handling, skill verification, and AI model calls, ensuring synchronized progress tracking [3].
- AI Interaction Layer (RPC & AI Models): Using Remote Procedure Calls, this layer enables communication between the back-end application and AI microservices. It handles recommendations, chatbot interactions, and knowledge graph queries. The integrated AI environment applies gamification rules, matching logic, and content personalization [5][6].
- AI Engine Core: This includes recommendation and matching models as well as the knowledge graph. NLP validates and interprets text from forums and chats. User skills and content are represented as vector embeddings and stored in a tamper-proof knowledge graph. Metrics like engagement, skill matches, and content hashes are tracked to ensure integrity [5][6].
- Data and Analytics Layer: A secure, distributed database system (SQL for users, NoSQL for content, Graph DB for skills) stores interaction histories [6]. Each service maintains a synchronized state. This layer supports auditing of engagement, progress tracking, compliance reporting, and real-time analytics for educational insights [10].

A. Algorithms Used

- Skill Matchmaking Algorithm: This algorithm ensures authentic and relevant peer-to-peer connections. It starts with verifying profile skills and goals, applies collaborative filtering, and prevents duplicate matches. Cosine similarity checks and state transitions ensure recommendation accuracy. Only matches with high confidence are added to users' Recommendation lists [3].
- Content Recommendation Algorithm: Personalized content is suggested across the student network. Proposed articles or forum posts are verified against user profiles and interaction history, with repeated analysis and relevance checks. Approved content populates the user dashboard, ensuring consistency,

fault tolerance, and relevance in the decentralized network [5][6].

- Natural Language Processing (NLP) Algorithm: A transformer-based NLP model maintains knowledge integrity. Messages from forums or chats are tokenized into 512-token blocks and processed through attention layers to generate high-dimensional vector embeddings representing their semantic meaning. This ensures accurate search results, meaningful chatbot responses, and semantic intent detection [5].

VI. SYSTEM IMPLEMENTATION SNAPSHOTS

The following section provides snapshots (Figure 2 to Figure 6) of the developed AI-powered Students Hub prototype, which demonstrates the critical functional modules, including intelligent peer matching, AI-driven support, and the progressive formation of a user's skill profile. Specifically, Figure 2 displays the main user dashboard, incorporating real-time skill recommendations and associated platform gamification status. Figure 3 visualizes the dynamic 'Skill Share' module, reflecting the AI-powered peer matching results. Figure 4 illustrates the profile configuration mechanism via a 'Skills I Have/Need' setup prompt. Figures 5 and Figure 6 capture the 'Knowledge Share' forum and the AI chatbot interaction, wherein users post queries or request information, followed by system or peer response dialogues. Collectively, these interfaces affirm the operational feasibility, system usability, and practical realization of the proposed architectural model.

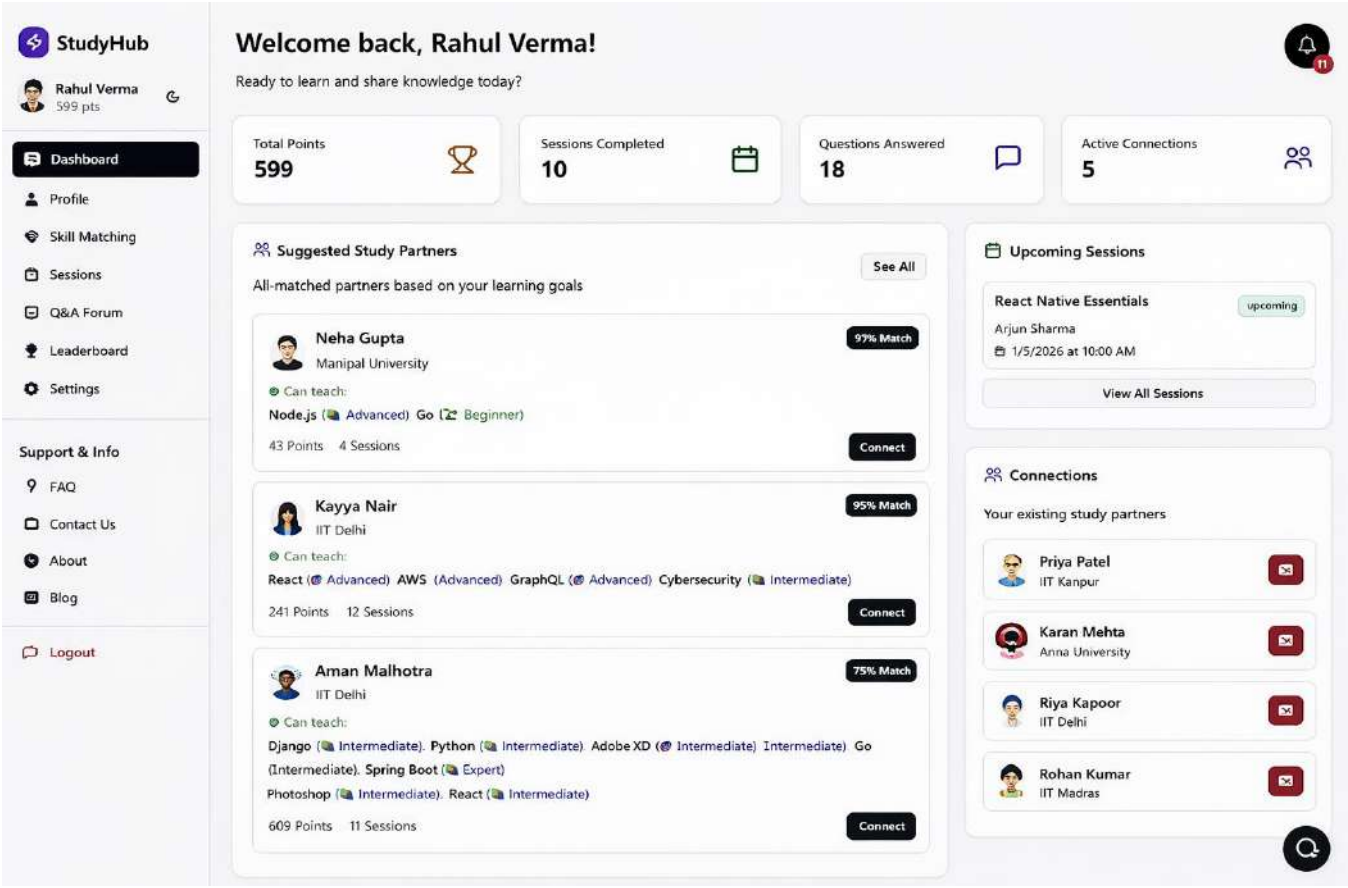

Figure 2: Dashboard Page

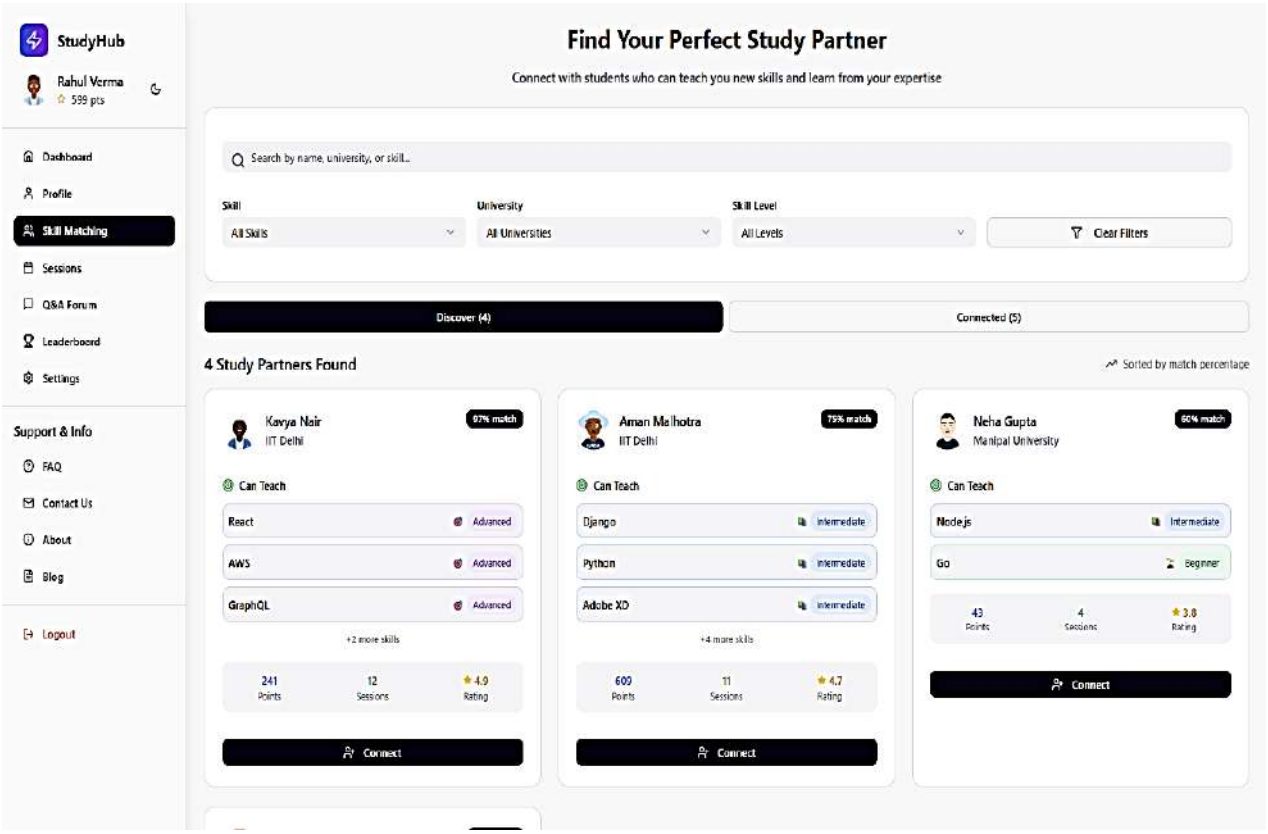

Figure 3: Skill Matching Page

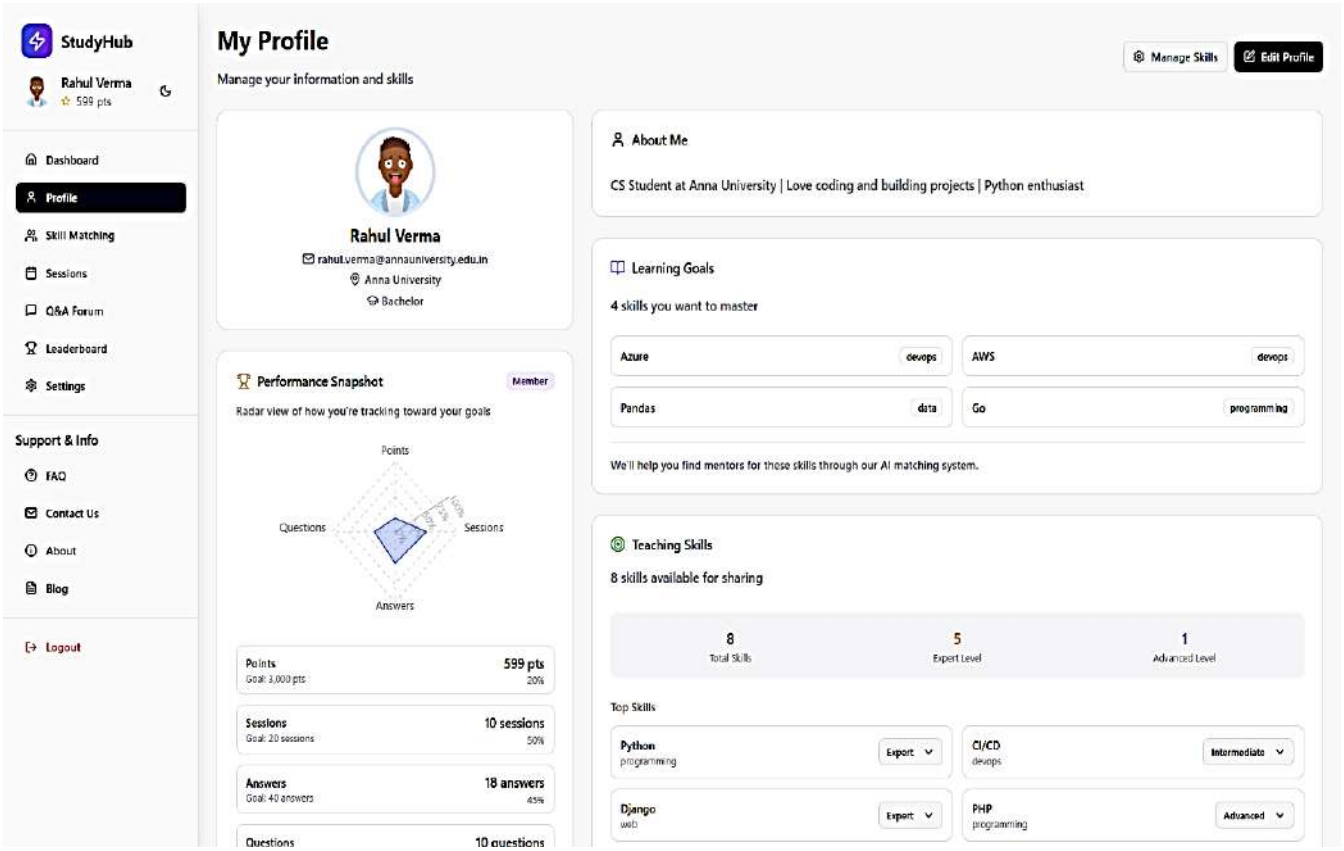

Figure 4: Profile Page

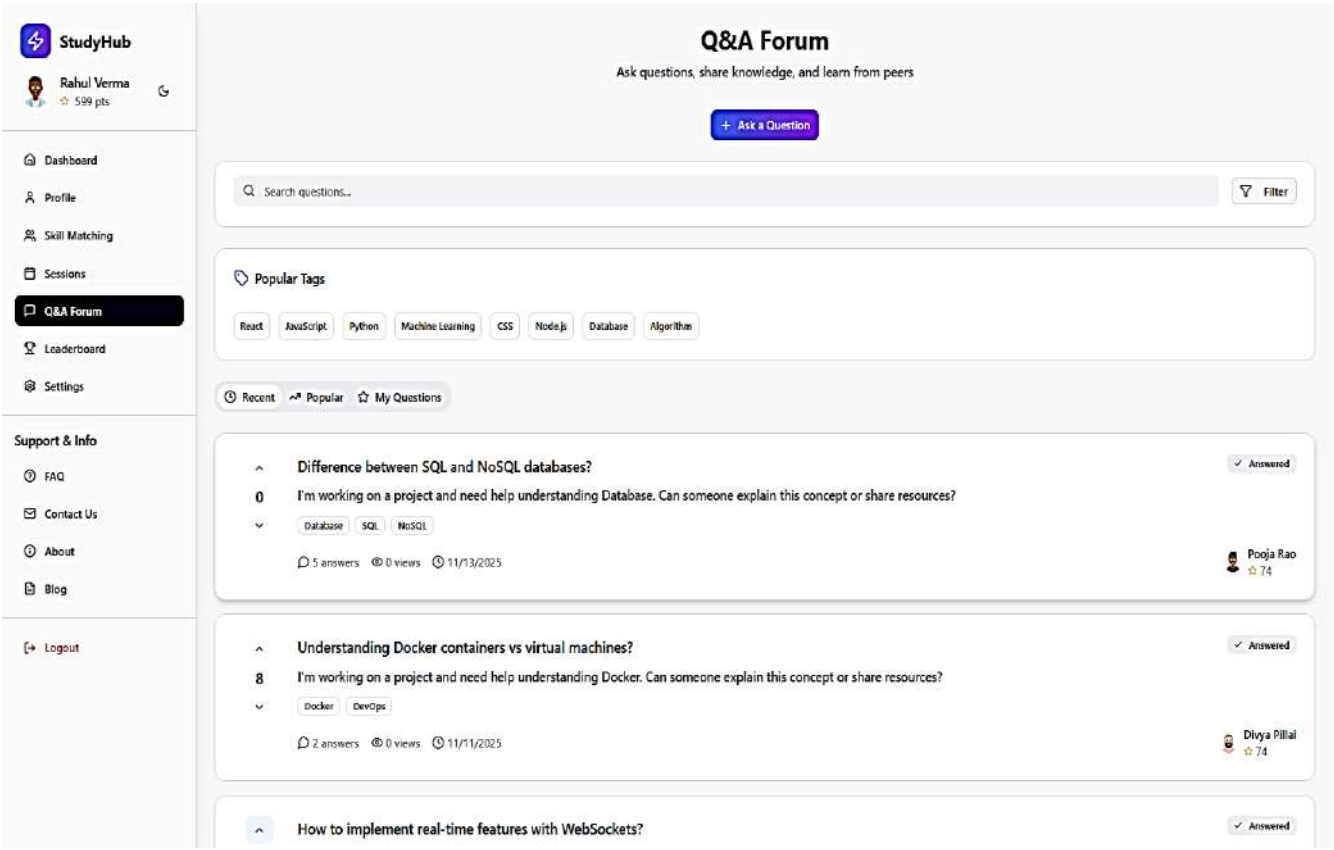

Figure 5: Q & A Page

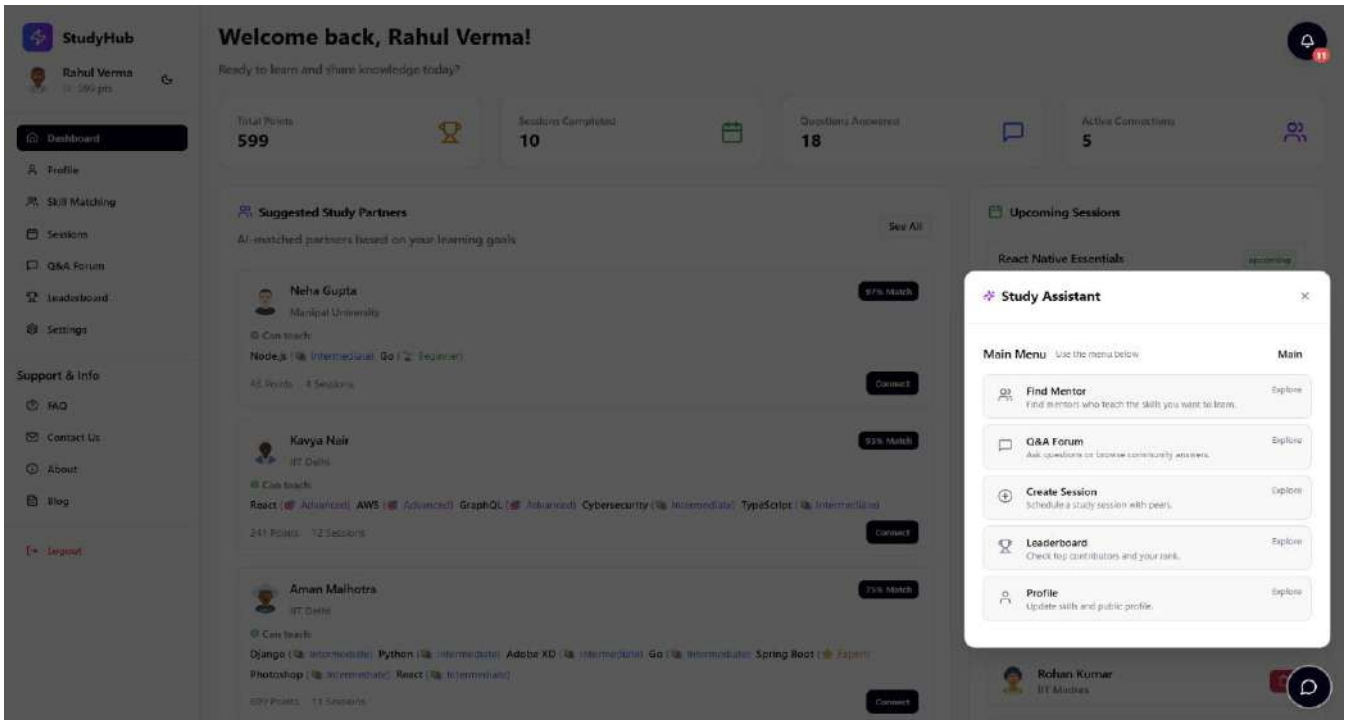

Figure 6: AI Assistant

VII. CONCLUSION

The AI Powered Students Hub is developed as a shared learning space where students exchange skills directly with one another in an easy and engaging manner. The platform offers useful AI-based functions, including matching learners with suitable peers, providing Chabot support when required, and tracking progress through basic reward features, all within a responsive web interface designed for ease of use. AI algorithms are used to link students with relevant peers and learning resources, which helps reduce dependence on isolated learning practices. This system

supports collaborative learning by suggesting peers and content in real time, allowing users to find what they need more easily without manual and time-consuming searches.The platform also maintains and displays user skill profiles, which supports enhancing personal development and engagement analytics. The Students Hub thus exemplifies a scalable and accessible solution for modern digital education, aligning peer-to-peer principles with practical, intelligent utility.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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