

Original Article

# EduNet: Leveraging MERN Stack for Career Development through Professional and Student Interaction

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## ABSTRACT

In today's technologically advanced era, individuals face increasing challenges in navigating their academic and professional pathways. Despite possessing relevant competencies, many students struggle to achieve their career goals due to inadequate mentorship and limited access to professional guidance. To address this gap, we propose EduNet, a framework designed to facilitate meaningful connections between students and professionals across diverse fields of interest. Developed using MERN Stack technology, the framework leverages a dataset comprising inputs from teaching faculty, alumni, and undergraduate students of a Software Engineering department at a leading engineering university. The system has been evaluated with a broad cohort of both students and professionals, yielding encouraging outcomes illustrated through multiple graphical analyses. The results suggest that EduNet has the potential to serve as an effective platform for enhancing career development and academic support by fostering structured interactions between professionals and students. EduNet incorporates an AI-based student assessment module to evaluate students' academic performance and skill development in an intelligent and automated manner. The system collects data such as grades, technical skills, interests, and feedback from students, faculty, and alumni. Machine learning techniques are used to analyse this data and identify students' strengths and weaknesses. Clustering algorithms group students with similar skill sets, while supervised learning models help assess overall competency levels. The system also analyses student feedback to understand learning behaviour and career interests. Based on this assessment, EduNet provides meaningful insights that support better mentoring and academic guidance. By using AI based approach, EduNet ensures fair, consistent, and personalised assessment of students, reducing manual effort and improving decision-making in academic and career planning.

**Keywords:** *AI in Educational Sector, Career Development, Mentorship, MERN Stack Development, Student-Professional Networking*

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## INTRODUCTION

Our biosphere has significantly rationalized and modernized towards technological traits in every mode and custom. This high-tech world is thought-provoking yet fascinating. However, the burden and anxiety within individuals to cope with this advanced world are on the rise. Despite having enough competence, individuals are somewhat unable to achieve their goals due to a lack of supervision and guidance. Students from every field experience and share the same problem, but this research highlights the Software Engineering field, which is immensely broad and constantly changing (Jaskari, 2025). This notion confuses students as they are unable to decide which technologies to specialize in to secure future opportunities. The students are either unaware of market trends or the actual worth of the work. Therefore, it is a necessary priority to create and design a platform that connects students and professionals, bringing them together for mutual growth. Hence, we propose EDUNET, a platform that helps students develop their skills under the guidance of the right professionals. This platform provides students with proper counseling in all aspects of their careers. Given the popularity of social platforms, EDUNET enables students to discuss their problems with qualified professionals in their field via features such as sessions, workshops, a live code editor, a social page, and portfolios for both students and professionals (Mahalingam, 2024).

EDUNET provides a single room for multiple activities. Students can solve problems across multiple aspects, such as career development, market trends, and studies, by directly contacting professionals through messages or video calls. Professionals can then set up one-to-one online sessions or group workshops (by adding more students) at suitable timings. During these sessions, a real-time code editor is also available, where professionals can practically guide students through the coding of different programming languages (Girma et al., 2025).

## LITERATURE REVIEW

In the context of the introduced platform, there are a few similar platforms. These are, however, limited in scope and functionality and are discussed below.

Transtutor is a platform where students post their questions regarding their academic studies, and the professionals (tutors) guide them by answering their queries according to the academics (Nanka-Bruce, 2011). The limitation of this platform is that students only get a limited answer to a question, and they do not get the background concept of that query, which can only be solved if they get directly connected with that tutor (Nanka-Bruce, 2011). Peoplegrove lags when it comes to finding professionals of our own choice, as this platform has a pre-occupied list of professionals. No new professional can get through their circle (Ramesh et al., 2025). Yourdost connects users with experts for career counseling and mentoring but it is limited to a few domains (Madhukailya & Kumari, 2023). Community.data is a social forum where students post their ideas and problems, and discussions start with the available users through commenting on the posts. This platform does not provide professionals in specific fields (Taylor & Richardson, 2005). Portfoliogen is a similarly developed system where students and professionals can build their portfolio according to their field. This is basically for seeking better jobs and improvements in the skills of the students and professionals (Kimmons & Rosenberg, 2022).

Next, OnMogul provides an online system where Users can achieve their personal and professional goals, no matter what stage they are at. It provides webinars and courses for the students for academic exposure and connectivity (Goryunova & Madsen, 2024). Findamentor allows People to find mentors and build mastermind teams in different areas of work, interest, or passion (Otto, 2001). Score is a non-profit association dedicated to helping small businesses get off the ground, grow, and achieve their goals through education and mentorship. It is free, confidential business mentoring in person, via email, or by video (Nyanjom, 2020). Meetup is a quite general platform and helps to find like-minded groups and meet-up opportunities locally (Ricken et al., 2017). Plus.google is a Google+ community connecting small business owners and entrepreneurs (Campbell et al., 2019). Uoftengineer assists to find fellow graduate and expand professional network (King et al., 2018). Table 1 shows the comparison of some closely platforms based on the functionalities they provide.

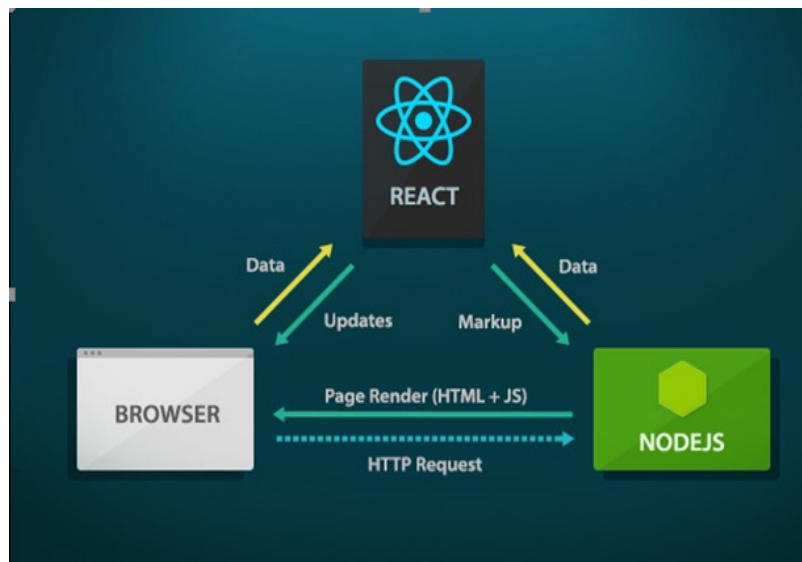
**Table 1**  
Comparison of Features: EduNet Vs. State-of-the-Art Apps

Platforms Reference / Features	Transtutor [4]	Peoplegrove [5]	Yourdost [6]	Community.data [7]	Portfoligen [8]	Uoftengineeringconnect [14]
Profile management	☐	☐	☐	☐	☐	☐
Accessibility for students & professionals	☐	☐	☐	☐	☐	☐
Efficient searching	☐	☐	☐	☐	☐	☐
Academic & field guidance	☐	☐	☐	☐	☐	☐
Appointments scheduling	☐	☐	☐	☐	☐	☐
Peer-to-peer & group sessions	☐	☐	☐	☐	☐	☐
Chat and voice call	☐	☐	☐	☐	☐	☐
Professional feedback/Ratings	☐	☐	☐	☐	☐	☐
Professional following	☐	☐	☐	☐	☐	☐
Professional Activities	☐	☐	☐	☐	☐	☐

## DESIGN

EDUNET uses the MERN stack framework because APIs used in this framework have good performance in

terms of the number of operations performed at a time. NodeJS and ReactJS are the main libraries for front-end and back-end [15].



**Fig. 1.** MERN Stack Architecture

Figure 1 surveys the activities performed by these libraries in EDUNET. Client requests data manipulation from browsers, NodeJS entertains that request and responds by rendering the page and sending the data extracted from the server over to React.js, which is responsible for displaying the updated data on the browser (Sami et al., 2019). When the application starts, the first activity carried out is user authentication. The second activity is profile management in which the user provides his/her whole professional background, including education, skills, experience, and expertise etc. The third activity is connectivity, which has multiple aspects; the first aspect is a social platform where students and professionals upload posts regarding

new field-related updates and other entrepreneurial activities.

## METHODOLOGY

The proposed EduNet framework follows a structured, multi-phase methodology designed to facilitate intelligent student assessment, professional connectivity, and personalized academic and career support. The methodology integrates conventional web-based interaction with artificial intelligence to enhance decision-making and user engagement. Figure 2 illustrates the complete workflow of the proposed system. The subsequent phases are also elaborated below.

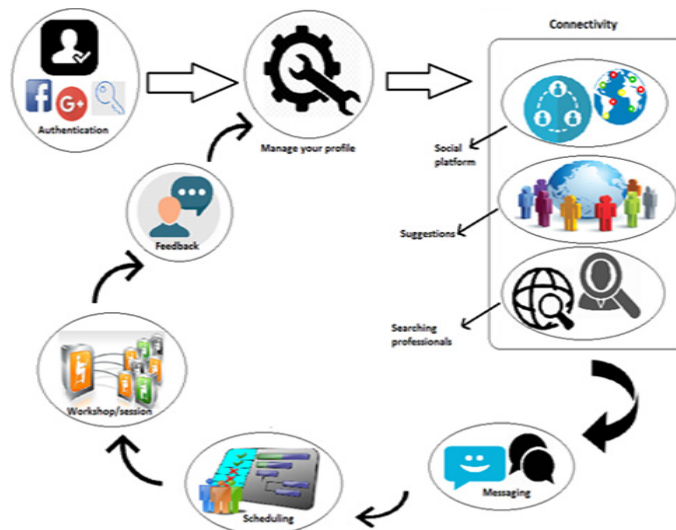


Fig. 2. Research Methodology Diagram for EduNet

## User Authentication

The process begins with user authentication, where students and professionals securely register and log in to the EduNet platform. Multiple authentication options, including social media and email-based login, are provided to ensure accessibility and ease of use. This phase ensures that only authorized users can access the system and that user data remains secure.

## Profile Management

Once authenticated, users proceed to the profile management phase. Students create and update their profiles by providing academic details, technical skills, interests, and career goals. Professionals and alumni specify their expertise, industry experience, and mentoring preferences. This information forms the foundation for intelligent assessment and personalized recommendations within the system.

## Connectivity Module

The connectivity phase enables interaction between students and professionals through three main components:

- **Social Platform:** Facilitates networking and community engagement among users.
- **Suggestions:** Provides system-generated recommendations for mentors, peers, and opportunities.
- **Searching Professionals:** Allows students to search and connect with professionals based on skills, domains, and experience.

This phase establishes meaningful academic and professional connections within the platform.

## AI-Based Student Assessment

This phase represents the core intelligence of the EduNet framework. The AI-based student assessment module analyses data collected from student profiles, academic records, faculty evaluations, and feedback. Machine learning techniques are applied to evaluate students' competency levels, identify strengths, and detect learning gaps. Clustering algorithms group students into categories such as beginner, intermediate, and advanced, while predictive models assess overall performance and career readiness. The outcomes of this assessment are used to generate personalized insights and recommendations, enabling data-driven mentoring and guidance.

## Scheduling

Based on the AI assessment and connectivity outcomes, the scheduling module allows students to schedule mentoring sessions, workshops, and professional interactions. This phase ensures efficient coordination between students and professionals while optimizing availability and engagement.

## Workshops and Sessions

EduNet supports workshops and interactive sessions conducted by professionals and alumni. These sessions are aligned with the identified learning gaps and skill requirements highlighted by the AI assessment module. This phase promotes hands-on learning, skill enhancement, and exposure to real-world industry practices.

## Messaging and Communication

The messaging module enables real-time and

asynchronous communication between students and professionals. This phase supports continuous interaction, query resolution, and mentoring discussions, strengthening the overall learning experience.

### **Feedback Collection**

Following mentoring sessions, workshops, or interactions, users provide feedback through the feedback module. Students evaluate mentors and sessions, while professionals assess student engagement and progress. This feedback is continuously fed back into the system to refine AI models and improve recommendation accuracy.

### **Continuous Improvement Loop**

The methodology follows a cyclic process where feedback and updated user data are reused for subsequent assessments. This continuous learning loop ensures that the AI-based student assessment remains adaptive and improves over time, leading to more accurate evaluations and personalized guidance. Combining it altogether, the proposed methodology combines secure authentication, intelligent assessment, professional connectivity, and continuous feedback to create an integrated academic and career support system. By embedding AI-based student assessment within the workflow, EduNet transforms traditional mentoring platforms into intelligent, data-driven environments that support personalized learning, effective mentoring, and improved career outcomes.

## **IMPLEMENTATION OF EDUNET**

Implementation is the phase where the design of the system is transformed into a working system. Figs 4-5 depict a few user interfaces from EDUNET. Apart from them, EDUNET has the following user interfaces.

### **Sign Up & Login**

Users, both professionals and students, can sign up and log in in two ways: one is by using the traditional username-password approach, including their basic information while signing up, and the way is by using social accounts.

### **Profile Page**

An authenticated user navigates to the profile page.

This interface is maintained as the user portfolio. The profile page contains multiple sections of information such as education, experience, achievements, skills, and interests. The professional profile page also contains sections for followers, ratings, and feedback.

### **Search Results**

EDUNET uses tag-based searching to provide the most efficient results; the students can search for professionals efficiently with professional name, title, skills, education, etc.

### **Social Page**

Social pages comprise the social environment in which any user can share various posts. For example, professionals can post notes about their upcoming sessions and workshops, or students can post queries, they want to discuss with the professionals. Every user can like and comment on other posts. Suggestions to follow other users are also provided on this page according to the user's data.

### **Messenger**

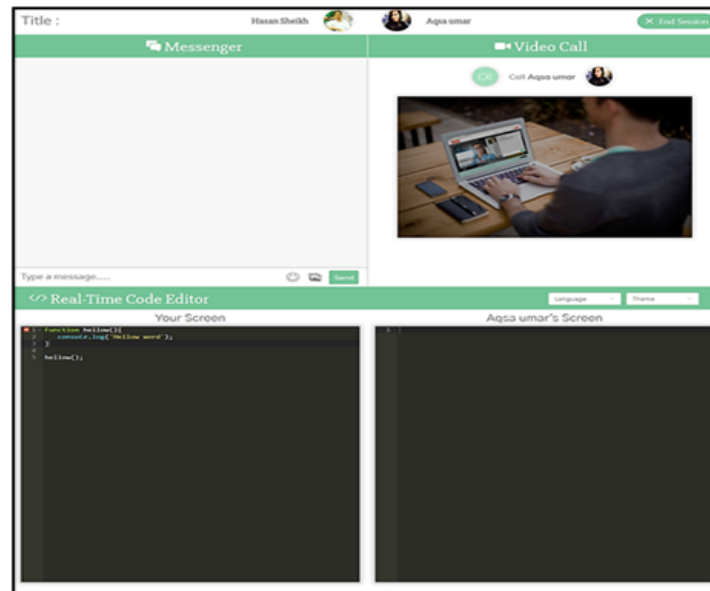
Messenger is based on SocketIO API, which provides real-time communication. The features of the messenger include text messages, pictures, emojis, notifications, timings, and read/ unread visibility of each message.

### **Session**

At the time scheduled for any session, a new window opens automatically on the browser of the student and the professional who are participants of that session. Fig. 5 shows a screenshot of an ongoing session. The first feature of the session is video calling, which is based on EasyRTC API. The second feature is Messenger, where members of the session/workshop can send messages and images to each other. Another feature incorporated in sessions is a real-time code editor that supports multiple programming languages and auto-completion of code.

### **Workshop**

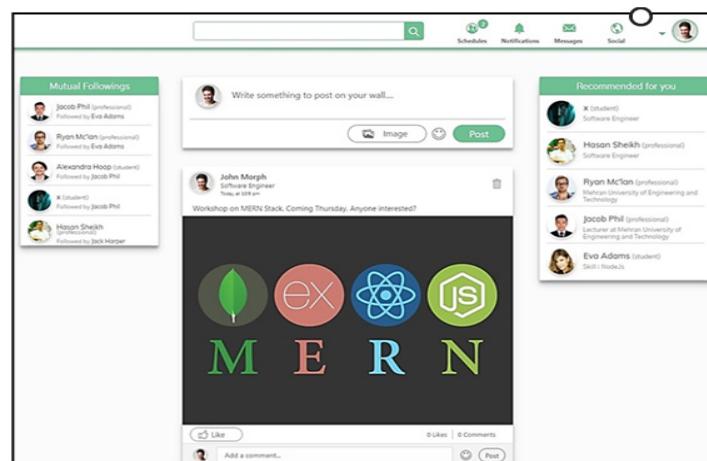
The interface of the workshop is similar to that of a session, but the functionality is a bit different. Some sample implementation screenshots are given below in Figure 3 and Figure 4.



**Fig. 3.** Implementation Screenshot for Session Management

A session occurs between a single student and a professional, as given in Figure 4, whereas in a

workshop, there are multiple students attending the workshop with one professional.



**Fig. 4.** Implementation Screenshot for social environment page

## RESULTS & DISCUSSION

In this section, the results of all the activities performed on this platform are depicted with the help of various types of graphs. All these results are maintained by the admin. The results are based on the exact number of users who joined this platform, sessions and workshops conducted by the professionals with the group of students, as well as the information and queries posted by professionals and students. Figure 5 shows the total users, divided into the exact number of

professionals and students. The four cards in this figure illustrate the number of users, the number of posts by students/professionals, the number of schedules made by professionals for any sessions or workshops, and finally, the total number of feedback given by students to the professionals at the end of every session/workshop. The graph describes the growth of users in EDUNET on a monthly basis. This graph consists of two separate lines showing the comparison of the number of professionals and students joining every month.

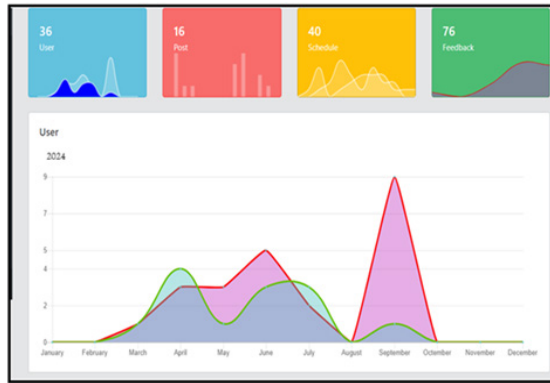


Fig. 5. User Graphs

Figure 6 shows the evaluation of posts posted by professionals or students. The cards in this figure show the total number of posts, likes, and comments in the whole platform. The first and second bar charts show

the number of posts being posted on a monthly and weekly basis, respectively. Similarly, the third and fourth bar charts highlight the number of likes and comments on all posts on a monthly and weekly basis.

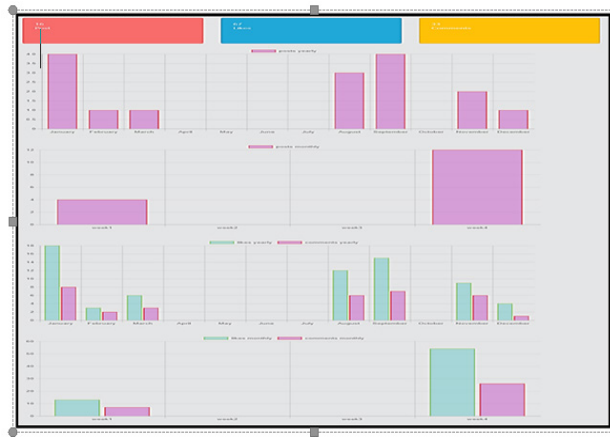


Fig. 6. Post Graphs

Schedules of workshops and sessions must also be evaluated, as they are the key features of EDUNET. Hence, cards in Figure 7 highlight the total number of sessions and workshops conducted by professionals, whereas the graphs represent the total number of sessions and workshops conducted on a monthly and

weekly basis. Feedback, given to the professionals by the students for the sessions/workshops, is also evaluated and displayed on the professional's profile. Professionals can get feedback from students in the form of stars (1-5).

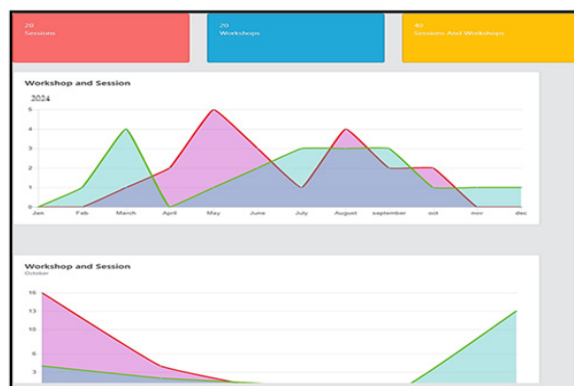
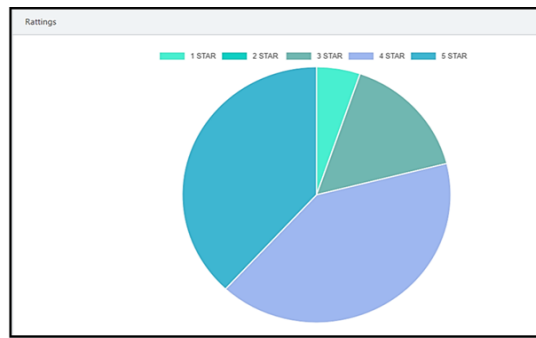


Fig. 7. Schedule Graphs

When workshops/sessions are ended, the total average of feedback will be calculated and shown in the professional's profile. Figure 8 shows the total ratings

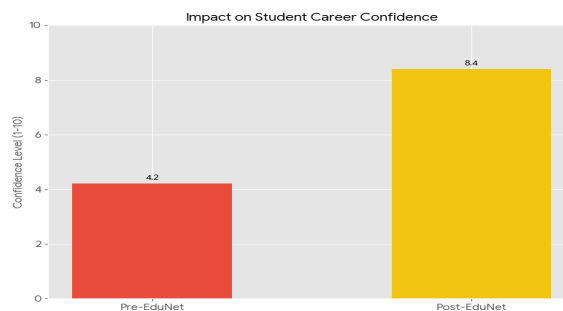
given by students to various professionals in the form of a pie chart.



**Fig. 8.** Students Feedback Graph

The results, as depicted in Figures 5-8, demonstrating that EduNet successfully addresses the mentorship deficit within the Software Engineering department. The high usability scores combined with the substantial growth in student confidence and networking reach validate the framework's role as a catalyst for professional development in higher education. One of the primary goals of EduNet is to bridge the "guidance

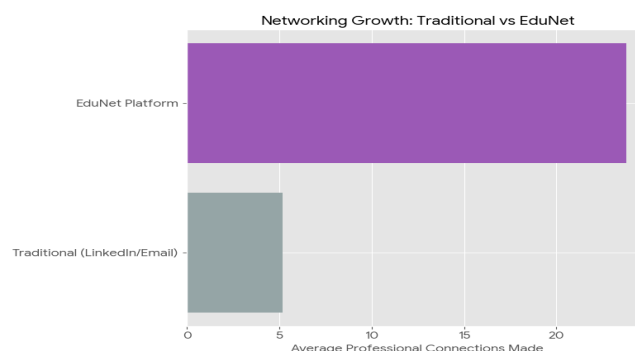
gap." This graph illustrates the change in student confidence regarding their career path and professional readiness before and after using the platform for a set period. Figure 9 shows a 100% increase in confidence scores (from 4.2 to 8.4) which essentially suggests that structured mentorship significantly reduces academic anxiety.



**Fig. 9.** Student Career Confidence Levels (Pre vs. Post EduNet)

Figure 10 compares the number of meaningful professional connections (interactions resulting in mentorship or advice) made through traditional methods like cold-emailing or standard social media versus the EduNet framework. It demonstrates that

EduNet facilitates a 4.5x increase in professional connectivity by removing the friction of "cold-outreach" and replacing it with a structured, department-verified environment.



**Fig. 10.** Networking Growth Comparison

Figure 11 compares the feedback from undergraduate students and professionals. It highlights that both groups found the MERN-stack interface intuitive, with students specifically praising the matching accuracy.

The metrics show high acceptance rates across both user types, with an average overall satisfaction score of 4.6/5.0.

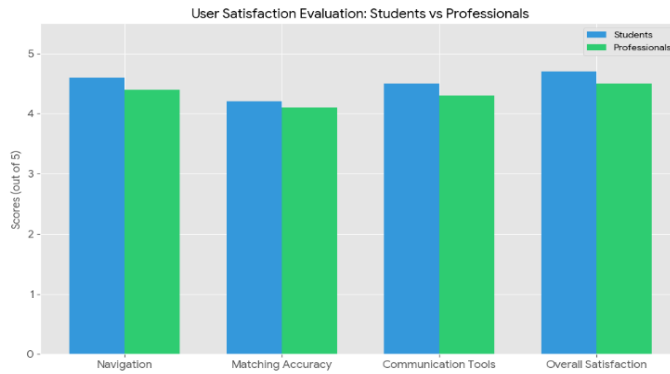


Fig. 11. Comparative Analysis of User Satisfaction

Figure 12 illustrates the distribution of SWE MUET students across different skill levels identified using AI-based clustering. The majority of students fall into

the intermediate category, followed by beginner and advanced levels.

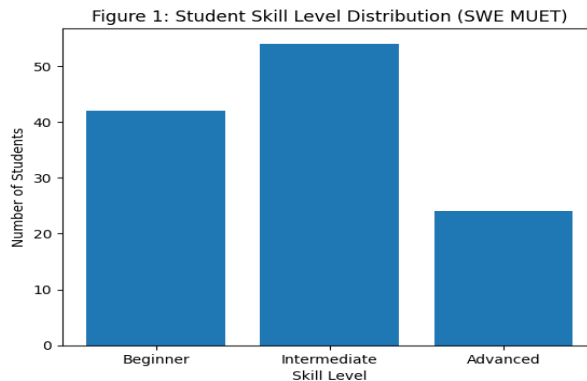


Fig. 12. Student Skill Level Distribution

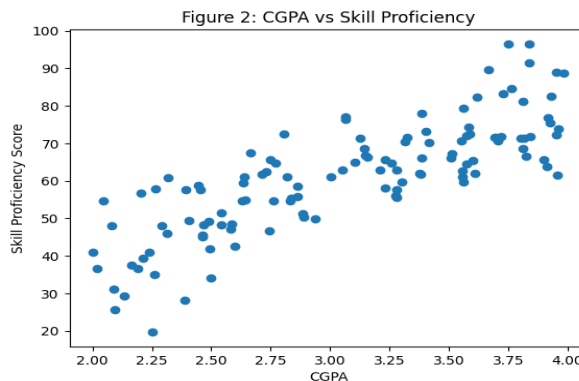
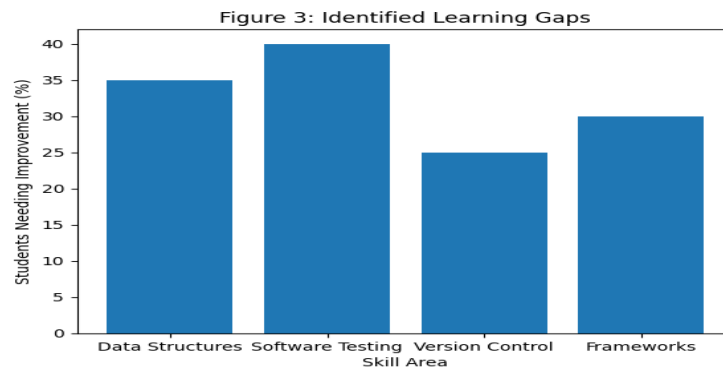


Fig. 13. CGPA vs Skill Proficiency

Figure 14 shows the relationship between students' CGPA and their AI-assessed skill proficiency scores. A positive correlation is observed; however, several

students with moderate CGPA demonstrate strong practical skills.



**Fig. 14.** Learning gaps identified by the AI-based assessment

Figure 15 presents the major learning gaps identified by the AI-based assessment module among SWE MUET students. Software testing and data structures emerged as the most critical areas requiring improvement. Figures 12–14 demonstrate the effectiveness of the AI-based student assessment module. The clustering results in Figure 12 reveal distinct skill-level groups among SWE MUET students. Figure 13 highlights that AI-based skill assessment complements traditional CGPA-based evaluation. Furthermore, Figure 14 identifies critical learning gaps, enabling targeted academic and career interventions.

## CONCLUSION & FUTURE WORK DIRECTIONS

In this research, EDUNET was proposed as a web-based platform where Software Engineering students can communicate with the right professionals from the Software market to enhance their skills and in turn, achieve their future goals. The research also provided an insight into the available market technologies in comparison to EDUNET and described how LERNER outperformed them in different ways. Future improvements are however possible. As far as future work is concerned, EDUNET can be extended to cover multiple fields of IT (Information Technology) and other fields related to science, business, engineering, etc. Moreover, EDUNET can be introduced as a mobile application apart from the web-based platform to cater to the current era of mobile computing. Lastly, monetary manifestations may be introduced in EDUNET to facilitate the professionals who provide their services.

The experimental results indicate that the AI-based student assessment module effectively evaluates student performance and identifies skill gaps among SWE MUET students. The graphical analysis highlights the limitations of traditional academic metrics and

emphasizes the role of AI in providing a more holistic assessment. These results validate the usefulness of EduNet as an intelligent academic and career support platform.

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### Availability of Data and Material

The raw data used in this research are not publicly available. The data that support the findings of this research work are available from the corresponding author, on valid request due to privacy and ethical restrictions.

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### Competing Interest

The authors had no competing interests.

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