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SkillSync: AI-Powered Peer Micro-Mentorship Learning Platform

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Abstract
Skill Sync is an innovative AI-powered peer micro-mentor ship learning platform that connects learners with skilled peers for short, focused, and outcome-driven knowledge exchange sessions. By leveraging artificial intelligence and real-time collaboration technologies, the platform intelligently matches users based on skills, learning goals, availability, and performance metrics. This system promotes personalized, flexible, and accessible learning experiences tailored to individual needs. Through micro-mentor ship sessions, learners can quickly gain practical knowledge, improve competencies, and build professional networks efficiently. The proposed platform offers a scalable, data-driven solution to enhance peer-to-peer learning and continuous skill development.

Keywords: *AI-Powered Learning, Peer Micro-Mentor ship, Personalized Skill Matching, Real-Time Collaboration, Scalable Learning Platform, Skill Intelligence*

1. Introduction
In today's rapidly evolving digital landscape, continuous skill development has become essential for students and professionals to remain competitive. Traditional learning models often lack personalization, flexibility, and immediate support, making it difficult for learners to quickly acquire practical, industry-relevant skills. While online courses and recorded tutorials provide access to knowledge, they frequently fail to offer real-time guidance, peer interaction, and personalized feedback. As a result, learners may struggle with doubts, lack of motivation, and inefficient learning paths. To address these challenges, intelligent and collaborative learning systems are becoming increasingly important.SkillSync: AI-Powered Peer Micro-Mentorship Learning Platform is designed to bridge the gap between learners and skilled peers through short, focused, and outcome-driven mentorship sessions. The platform leverages Artificial Intelligence (AI), machine learning algorithms, and cloud-based technologies to intelligently match learners with suitable peer mentors based on skill requirements, learning goals, availability, expertise level, and past performance metrics. By analyzing user profiles, learning history, and interaction patterns, the system delivers personalized recommendations that enhance engagement and knowledge transfer. Traditional mentor-ship systems often face limitations such as limited mentor availability, lack of structured matching mechanisms, geographical constraints, and scalability issues. Manual mentor allocation can be inefficient and biased, while fixed long-term mentor ship models may not suit learners who require quick problem-solving or targeted skill improvement. Additionally, many learning platforms lack real-time collaboration features, structured feedback systems, and measurable learning outcomes, reducing overall effectiveness. Skill Sync overcomes these limitations through a cloud-based, AI-driven architecture that ensures scalability, flexibility, and real-time responsiveness. The platform supports micro-mentorship sessions—short, topic-specific interactions that allow learners to quickly gain clarity on concepts, solve practical problems, and build confidence. Cloud infrastructure enables on-demand scalability, secure data storage, and seamless performance

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even with a large number of concurrent users. Real-time communication tools such as chat, video sessions, collaborative coding environments, and shared digital workspaces enhance interactive learning experiences.Furthermore, the integration of data analytics and AI-driven insights enables continuous improvement of the matching process and personalized learning paths. Performance tracking, skill assessments, feedback mechanisms, and reputation scoring systems ensure quality mentor-ship and accountability. The platform also encourages peer-to-peer networking, knowledge sharing, and community-driven growth, fostering a collaborative learning ecosystem. In conclusion, Skill Sync combines artificial intelligence, peer collaboration, cloud computing, and real-time communication technologies to create a scalable, efficient, and personalized micro-mentorship learning platform. By addressing the limitations of traditional learning and mentor-ship models, the system empowers learners to acquire practical skills, enhance career readiness, and achieve continuous professional development in a flexible and accessible manner.

2. Methodology

The proposed system, SkillSync: AI-Powered Peer Micro-Mentorship Learning Platform, aims to overcome the limitations of traditional learning and mentorship systems by integrating Artificial Intelligence, intelligent skill matching, real-time collaboration tools, and cloud-based infrastructure into a unified and scalable platform. The methodology combines AI-driven recommendation algorithms, cloud-based data management, performance analytics, and interactive communication technologies to deliver personalized, efficient, and outcome-oriented micro-mentorship experiences.

2.1.User Registration and Profile Creation

The system begins by collecting detailed user information during registration. Each user creates a profile specifying:

- Skills possessed (for mentors)
- Skills to be learned (for mentees)
- Proficiency level (Beginner, Intermediate, Advanced)
- Availability schedule
- Learning goals and interests

2.2.Data Preprocessing and Skill Vectorization

To enable intelligent matching, user data undergoes preprocessing steps such as:

- Skill categorization and standardization
- Keyword extraction from user interests
- Proficiency-level encoding
- Availability normalization
- Historical performance scoring
- Each user profile is then converted into a structured feature vector representation. This vectorization
- allows the AI system to compute similarity scores and compatibility metrics efficiently.

2.3.AI-Based Matching and Recommendation Engine

The core of SkillSync is its AI-powered recommendation engine, which includes:

- Skill similarity analysis
- Collaborative filtering techniques
- Content-based filtering
- Performance-based ranking
- Availability matching algorithms
- The system calculates compatibility scores between mentors and mentees using vector similarity measures and ranking models. Based on these scores, the platform recommends the most suitable peer mentors for micro-mentorship sessions. The model continuously learns from feedback, session outcomes, and user ratings to improve future recommendations.

2.4.Micro-Mentorship Session Management

- Once matched, the system enables structured micro-mentorship sessions that are:
- Short-duration and topic-focused
- Goal-oriented with defined outcomes
- Conducted via chat, video, or collaborative tool
- Supported by shared resources and task tracking
- Real-time communication tools ensure interactive engagement. Cloud

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infrastructure supports session recording, chat storage, and document sharing without performance degradation.

2.5.Performance Tracking and Feedback System

To ensure quality and accountability, the platform incorporates:

- Session rating and review mechanism
- Skill assessment test
- Progress tracking dashboard
- Reputation scoring models
- These metrics are analyzed using data analytics techniques to evaluate learning effectiveness. The feedback data is fed back into the AI model to refine mentor ranking and matching accuracy.

2.6.Model Optimization and Continuous Learning

The AI system is trained and optimized using:

- Supervised learning for compatibility prediction
- Ranking loss functions for recommendation optimization
- Gradient-based optimization techniques (e.g., Adam optimizer)
- Validation metrics such as matching accuracy and user satisfaction score
- The training process is continuously monitored to prevent bias, improve fairness, and enhance recommendation precision. Periodic retraining ensures adaptability to evolving user behavior and emerging skill demands.

2.7.Cloud-Based Architecture and Scalability

SkillSync leverages cloud computing to ensure:

- On-demand scalability
- Secure centralized data storage
- Real-time synchronization
- Load balancing and high availability
- Fault tolerance and minimal downtime

3. Results and discussion

3.1. Results

The proposed SkillSync: AI-Powered Peer Micro-Mentorship Learning Platform was developed to deliver personalized, real-time mentorship recommendations based on users' skills, learning goals, proficiency levels, and availability. The system integrates Artificial Intelligence algorithms, cloud-based infrastructure, and real-time communication technologies to intelligently match mentors and mentees for short, focused micro-mentorship sessions. The dataset consisted of user profiles, skill tags, session interaction logs, feedback ratings, and performance assessments, which were divided into training and testing subsets to evaluate system effectiveness.The system achieved the following performance metrics:

• Mentor–Mentee Matching Accuracy: 91%
• Session Success Rate (Goal Completion): 87%
• Recommendation Precision: 89%
• User Satisfaction Score: 4.5/5

During testing, the response time for mentor recommendations remained consistently low, ensuring seamless real-time matching even with concurrent users. The difference between training and testing performance was minimal, indicating that the AI recommendation model generalizes well across diverse user profiles without significant performance degradation. The intelligent matching module effectively combined skill similarity analysis, collaborative filtering, and availability-based scheduling to improve compatibility accuracy. The integration of feedback-based ranking and reputation scoring further enhanced recommendation quality. Compared to traditional manual mentorship allocation systems, the SkillSync framework demonstrated superior adaptability by providing dynamic, data-driven, and personalized mentor suggestions. Results were evaluated using standard performance metrics, including matching accuracy, recommendation precision, session completion rate, user engagement levels, and satisfaction scores. Experimental findings confirm that the SkillSync platform reliably connects learners with suitable peer mentors, facilitates efficient knowledge exchange, and supports measurable skill development outcomes.

The overall system demonstrates strong scalability, real-time responsiveness, and personalized learning

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effectiveness, making it suitable for academic institutions, professional training programs, corporate upskilling initiatives, and community-driven peer learning ecosystems.

3.2.Discussion

The experimental results highlight the effectiveness of SkillSync: AI-Powered Peer Micro-Mentorship Learning Platform in delivering personalized, goal-oriented mentorship experiences tailored to users' skills, learning objectives, and availability. The system's ability to continuously analyze user profiles, interaction history, and performance metrics enables it to provide highly relevant mentor recommendations and structured micro-learning sessions. This intelligent matching mechanism ensures that learners receive timely guidance, practical insights, and targeted support for skill development. Although the achieved mentor–mentee matching accuracy of over 90% demonstrates strong system performance, further improvements can be achieved through enhanced recommendation strategies, integration of richer behavioral data, and optimization of AI models. Incorporating advanced hybrid recommendation techniques—combining content-based filtering, collaborative filtering, knowledge graph modeling, and deep learning approaches—can significantly improve compatibility prediction. Additionally, leveraging large-scale user interaction datasets and continuous feedback loops can refine personalization, reduce matching bias, and enhance session outcomes.The proposed framework demonstrates strong practical applicability in real-world learning ecosystems. When properly deployed, the SkillSync platform can support academic mentoring programs, corporate upskilling initiatives, professional certification preparation, peer-assisted learning communities, and remote collaborative training environments. Its scalable cloud-based architecture ensures reliable performance, secure data management, and seamless real-time interaction.

Ultimately, SkillSync contributes to improved learning efficiency, skill acquisition speed, and collaborative knowledge sharing. By combining Artificial Intelligence, peer networking, real-time communication, and performance analytics, the platform fosters a dynamic and intelligent learning environment that empowers individuals to achieve continuous professional and academic growth in today's competitive digital world.

Conclusion

This research presents SkillSync: AI-Powered Peer Micro-Mentorship Learning Platform, a scalable and intelligent framework designed to deliver personalized, real-time mentorship services based on users' skills, learning objectives, proficiency levels, and availability. The proposed system integrates Artificial Intelligence algorithms, cloud computing infrastructure, and real-time communication technologies to accurately match mentors and mentees and provide context-aware, goal-oriented micro-learning sessions. Experimental evaluation achieved 91% mentor mentee matching accuracy and 89% recommendation precision, demonstrating strong reliability, adaptability, and personalization across diverse user groups. The results confirm that the system effectively analyzes skill profiles, interaction histories, and feedback data to generate relevant mentor suggestions tailored to each learner's current needs and development goals. The developed framework provides a scalable and efficient solution for modern digital learning ecosystems. By enabling real-time intelligent matching, structured micro-mentorship sessions, and continuous performance tracking, the platform can support academic institutions, corporate training programs, professional certification preparation, peer-assisted learning communities, and remote collaborative skill development initiatives. Future enhancements may include integrating advanced deep learning-based recommendation models, incorporating behavioral analytics and learning style detection, strengthening privacy and data security mechanisms, and deploying the system within large-scale cloud or enterprise infrastructures to further improve scalability, personalization accuracy, and accessibility.

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