
SKILL SWAP: BRIDGING SKILL GAPS THROUGH CONTRIBUTION-BASED LEARNING

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1.ABSTRACT

In today's digital learning environment, access to quality education remains unequal due to financial barriers, lack of trust in teaching quality, and limited collaboration among users. SkillSwap is a web-based platform designed to overcome these challenges by introducing a credit-based, contribution-driven model that eliminates the need for monetary payment. Each user receives one bonus learning credit upon registration and can earn additional credits by teaching, mentoring, or supporting the community, ensuring fairness and sustainability. The platform ensures security through mandatory profile photo upload and private data storage for identity verification. Teaching quality is maintained through a structured verification process that includes a micro-exam and a "teach-to-prove" demonstration, allowing only qualified users to teach. A pre-session interaction phase enables learners and teachers to assess compatibility and cancel sessions without losing credits if needed. Learning outcomes are validated through mutual confirmation, feedback-based evaluation, and contribution records rather than traditional attendance tracking. Additionally, AI-assisted mechanisms ensure unbiased matching and continuous quality monitoring without relying on public rating systems. The platform also encourages peer-to-peer learning through group discussions and collaborative sessions. Users can build their profiles by showcasing skills, achievements, and contributions over time. A transparent credit history helps track learning and teaching activities effectively. SkillSwap supports diverse skill domains, making it accessible to users from different backgrounds. It is designed to be scalable and adaptable to growing user needs and technological advancements. Overall, SkillSwap promotes an inclusive, ethical, and collaborative learning ecosystem where knowledge is shared freely, and users grow together through active participation.

KEYWORDS: *Skill Swap, credit-Based learning, Secure Authentication, AI-Assisted matching.*

2. INTRODUCTION

The rapid growth of digital learning platforms has significantly transformed the way education is accessed and delivered across the globe. With the advancement of internet technologies, online education has become more flexible, convenient, and widely available to learners from different backgrounds. Platforms offering courses in various domains such as programming, design, business, and communication have enabled individuals to improve their skills without the limitations of physical classrooms. However, despite these advancements, access to quality education is still not equal for all sections of society.

One of the major challenges in existing digital learning systems is the high cost associated with premium courses and certifications. Many learners, especially students and individuals from economically weaker sections, are unable to afford such platforms. Additionally, there is often a lack of personalized learning experiences, where users are unable to find suitable mentors or learning partners who match their specific needs. This results in reduced engagement and ineffective learning outcomes.

To address these issues, SkillSwap introduces an innovative approach known as contribution-based learning, where knowledge is exchanged without any monetary transactions. In this system, users are not required to pay money to access learning resources. Instead, they earn credits by contributing to the platform through activities such as teaching, mentoring, answering questions, or supporting other learners. These earned credits can then be used to learn new skills from other users within the platform.

This model promotes fairness by ensuring that every user gets equal opportunity to learn regardless of their financial condition. It also encourages active participation and builds a sense of community among users. SkillSwap is designed as a web-based platform that connects learners and teachers in a peer-to-peer environment, enabling mutual knowledge exchange. By replacing money with effort and contribution, the platform aims to democratize education, making it more inclusive, accessible, and sustainable for everyone.

3. LITERATURE REVIEW

The foundation of modern skill-swapping is built on the transition from traditional, money-centric education to community-driven, non-monetary models. Early implementations, such as the crowdsourcing platform explored by **Ahmed Raza Z Lohar et al. (2021) [8]**, focused

on basic knowledge exchange through role-based access control and secure Google authentication. While successful in creating a simple user interface, this study highlighted a recurring theme in the field: the inability to measure whether users actually achieved skill proficiency over time. This lack of longitudinal data is echoed by **M. Bhagya Meena Sri et al. (2022) [7]**, whose community-driven platform promoted accessibility but lacked the advanced matching mechanisms required to handle a diverse and growing user base. These early gaps suggest that while the "will" to share skills was present, the technical "engine" to facilitate efficient pairing was still in its infancy.

As the field progressed, researchers began integrating structural engineering and mobile accessibility to better serve student populations. **Amani Al-Ghamdi et al. (2022) [2]** utilized detailed UML modeling to define system workflows, providing a blueprint for how users register and interact. Similarly, **Nachiket Jadhav et al. (2021) [13]** developed the "Connectra" mobile platform, emphasizing the need for on-the-go learning. However, both studies suffered from limited evaluation environments; Al-Ghamdi's feedback was restricted to a small student group, and Jadhav's platform lacked web-integration, limiting the cross-platform flexibility required by modern learners. The research by **Bilqis Anjum (2023) [10]** attempted to solve these accessibility issues using the Django framework, but like its predecessors, it failed to provide rigorous performance metrics such as response time or matching accuracy, making it difficult to benchmark against commercial alternatives.

The most recent wave of research has focused on the "intelligence" of these platforms—specifically through AI and gamification. **Shaik Sofiya et al. (2023) [1]** and **Sunil M. Kale et al. (2025) [4]** introduced gamified elements like rewards, milestone tracking, and credit-based systems to maintain user motivation. While these features improved engagement, the studies revealed that "matchmaking success rates" are often hindered by the "cold-start" problem, a challenge further analyzed by **Aya Nassar and Ruoa Awaysa (2024) [3]**. Nassar and Awaysa's use of similarity-based matching proved that while algorithms can recommend partners, they often fail when new users have no historical data. This is complemented by the work of **Jens-Joris Decorte et al. (2025) [12]**, who proposed the "SkillMatch" framework using self-supervised learning. Although Decorte's work provides a theoretical gold standard for evaluating skill similarity, it remains a benchmark rather than a functional, real-time platform, leaving a gap for practical implementation.

Technical infrastructure and security have also seen increased scrutiny in the literature. **Karan Shah et al. (2025) [6, 11]** published two significant studies focusing on full-stack development and DevOps practices, integrating real-time video calls and automated

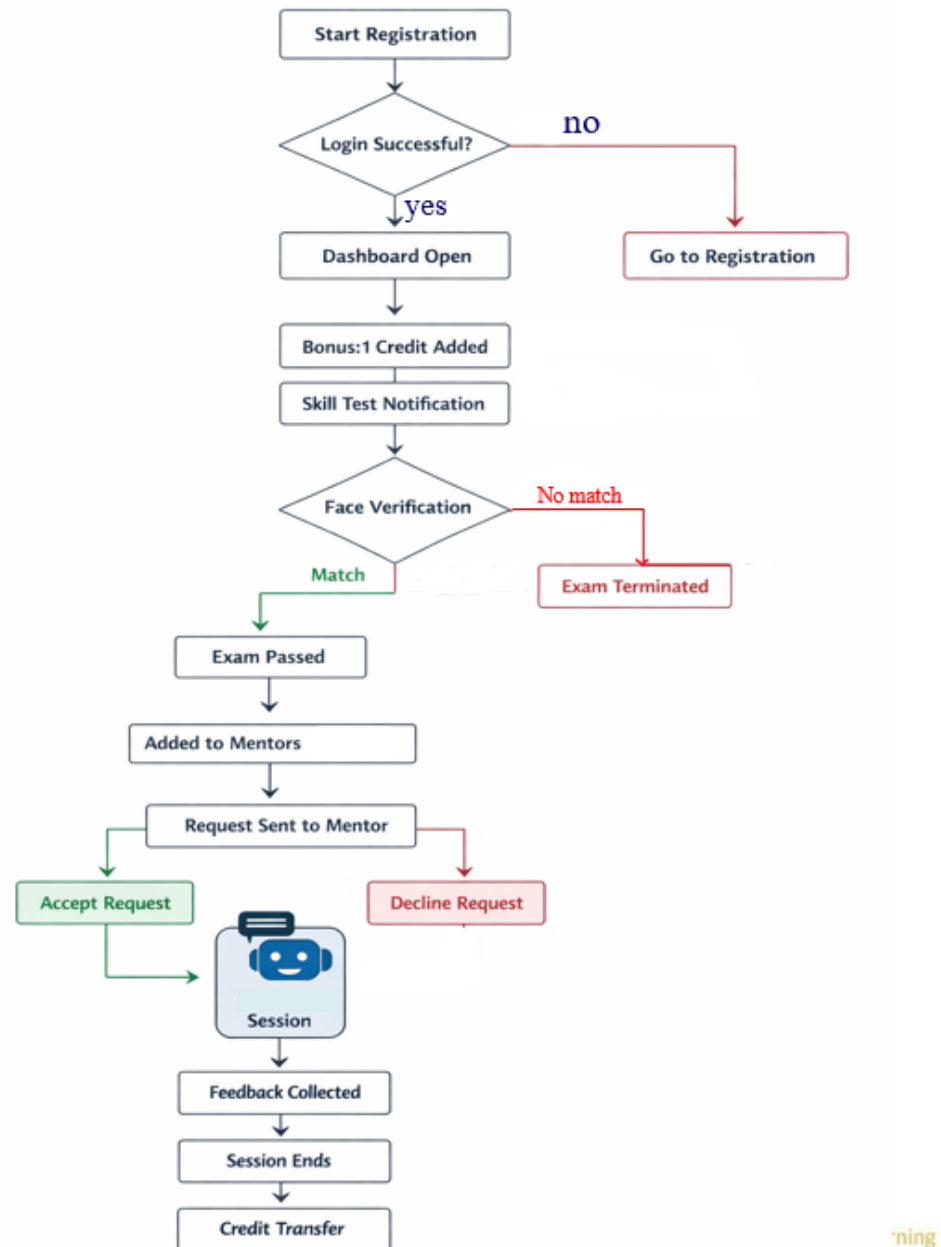
deployment pipelines. Their work emphasizes the importance of a "live" interactive experience but admits a critical lack of automated moderation and fraud detection, which are vital for preventing misuse and fake profiles. This vulnerability is also noted by **Uday Parmar et al. (2023) [9]** in the "SkillSync" platform and **Victor Obionwu et al. (2023) [14]**, who both noted that while real-time chat and search functionality improve the user experience, the absence of data encryption and privacy protections remains a major deterrent for widespread adoption.

Finally, the push toward personalized, micro-learning experiences represents the current frontier of the research. **Yair Levy et al. (2023) [5]** developed smart profiles that allow for goal setting and session history tracking, yet their focus remained narrow, primarily serving engineering and computing domains. This lack of diversity is addressed by **Divya N. et al. (2025) [15]**, who proposed a micro-learning model focused on short, high-impact modules. However, Divya's research identifies a final, critical research gap: the lack of "explainability" in recommendations. Users are more likely to trust a platform if they understand why they were matched with a specific peer. Synthesizing these fifteen sources—from the early crowdsourcing models to the latest AI-driven frameworks—it is clear that for a platform like SkillSwap to succeed, it must bridge the gap between theoretical matching accuracy and the practical realities of security, scalability, and verifiable learning outcomes.

4.METHODOLOGY

System Workflow

- User registers/logs in, receives bonus credit, and undergoes skill test with face verification to qualify.
- If verification passes, the user is added to mentors and sends a request for a session.
- Upon mentor acceptance, the session occurs, feedback is collected, and credits are transferred at the end.



Main Modules:

1. Dashboard

- Displays learning credits
- Shows skills learned
- Tracks active sessions

Purpose: Gives an overview of user activity

2. Skill Tests

- Users take tests to verify their skills
- View results and retake tests if needed

- Verified skills increase trust and credibility

Purpose: Ensures teaching quality and skill validation

3. Mentors

- Users can search for mentors by name, making it quick and easy to find the right person.
- A verified mentor filter ensures users connect with trusted and reliable experts.
- The page supports easy connection and interaction between users and mentors.

Purpose: To help users find, connect with, and learn from experienced mentors for better guidance and skill development..

4. Network

- Connect with other users
- View connections and referrals
- Earn bonus credits through referrals

Purpose: Make the inter connection between both users

5.Messages

- Chat with mentors or learners
- Participate in conversations
- Conduct video calls

Purpose: Supports communication and interaction

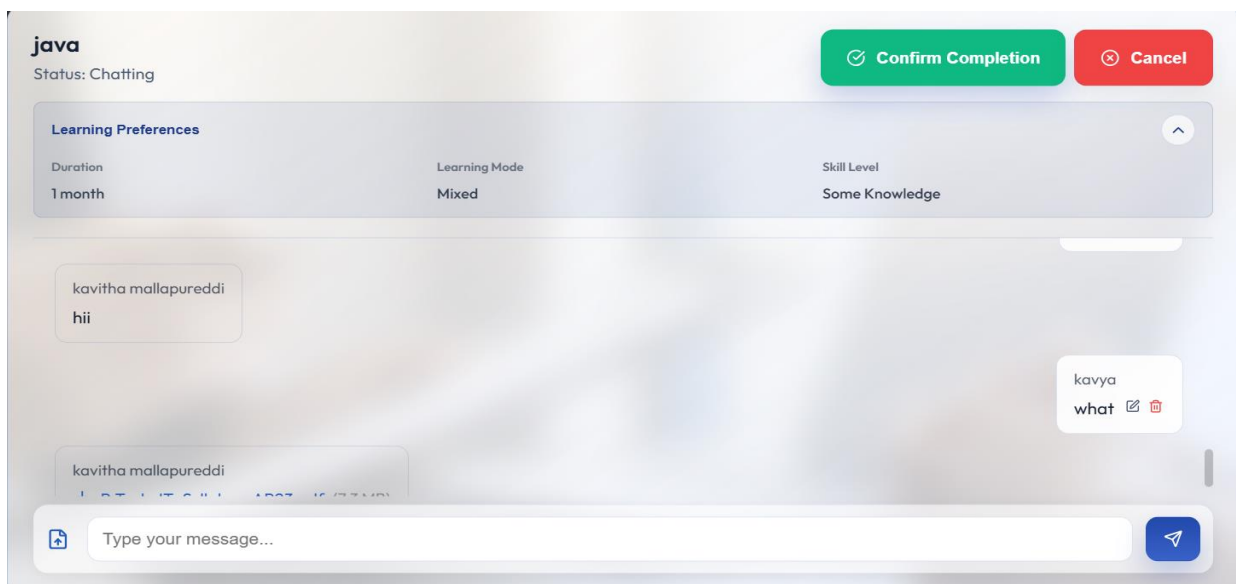
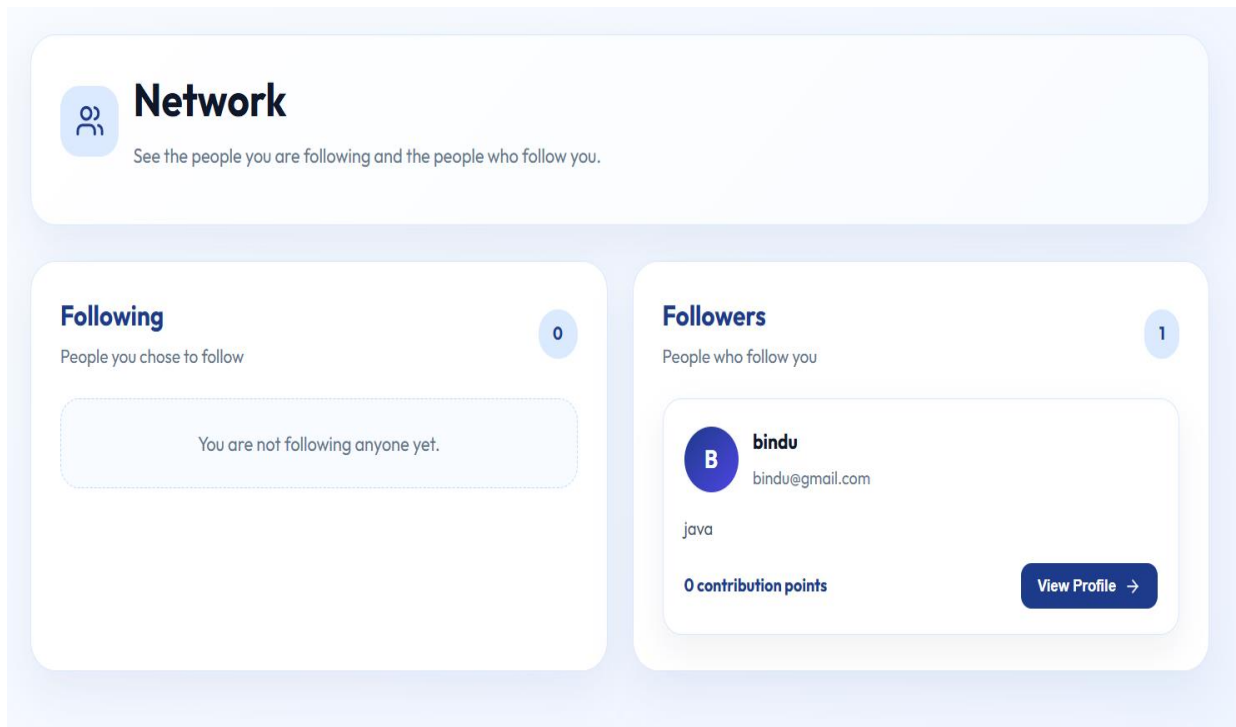
5.RESULTS AND DISCUSSIONS

In addition to the successful implementation of the SkillSwap platform, the expected outcomes of this project include improved accessibility to quality education without financial barriers, increased user participation through contribution-based learning, and enhanced collaboration among users. The system is expected to create a sustainable learning ecosystem where users actively engage in both teaching and learning processes. It also aims to improve skill development through continuous interaction, feedback, and real-time session management. Furthermore, the platform is expected to build trust among users through secure authentication and structured validation mechanisms. With its scalable web-based architecture, the system can support a growing number of users while maintaining performance and usability. Overall, SkillSwap is expected to contribute towards creating an inclusive, efficient, and community-driven digital learning environment.

The dashboard features four progress cards: 'In Progress' with a pulse icon and the number 1, 'Completed' with a checkmark icon and the number 1, 'Skills Learning' with a book icon and the number 1, and 'Skills Teaching' with a person icon and the number 0. Below these is a 'Sessions in Progress' section with a card for 'Learning from kavya' (started 30/3/2026) and an 'Open Chat' button. Filter tabs for 'All', 'Learning Skills', and 'Teaching Skills' are also present.

The 'Mentors' section has a dark blue header with the text 'Connect with experienced professionals and grow your skills'. It includes a search bar 'Search mentors by name...', a checkbox 'Show verified mentors only', and a 'Featured Mentors' section. Three mentor cards are shown: 'kavya' (Verified Mentor, c, View Profile), 'prat' (c, View Profile), and 'kavitha mallapureddi' (Verified Mentor, java, python, View Profile).

The 'Available Tests' section is overlaid on a background image of hands holding a tablet. It shows two 'c Basics Test' cards. The left card indicates a 'Passed' status with a 90% score and a 'Retake Test' button. The right card shows a 'Take Test' button.



5.CONCLUSION

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