

Skill X Change: AI Powered Neighborhood Skill X Change for Inclusive Community Learning

Sagar Kumar¹, Saksham Hayaran², Mr. Jagveer Singh³

^{1,2}B. Tech CSE Galgotias University Greater Noida, India

³CSE Department, Galgotias University Greater Noida, India

Abstract—Not everyone has access to high-quality learning experiences, be they financial, geographic or resource constraints at the community level. SkillXChange tackles challenge by bringing in an AI powered neighborhood skill exchange platform which help people to learn, teach and collaborate applying skills with local places. In a departure from the conventional paid model for learning, DEX is a community platform that encourages sharing of knowledge, where learners can teach or get support in areas such as tutoring, skills like technology and creative arts and life lessons but based on contributions and time rather than cash.

The platform makes use of AI to match learners with mentors intelligently by considering skillset, availability, learning preference, and location. Focusing on local connections, SkillXChange encourages community participation, peers' learning and inclusivity among students, job seekers, housemakers and professionals. The system also provides reputation-based trust models, personalized recommendation and adaptive learning support in order to enhance user experience and trust. SkillXChange is a platform to close the skill gap between demand and supply allowing people to be learners as well as contributors. The approach demonstrates the potential for AI-supported, crowd-sourced platforms to promote such inclusive, sustainable, and socially beneficial learning and making in a way that is less formalized and more locally participatory.

Index Terms—Skill Exchange Platform, Artificial Intelligence, Community Learning, Peer-to-Peer Education, Inclusive Learning, Skill Matching, Neighborhood Networks, Collaborative Learning, Digital Learning Platforms, Social Impact Technology

I. INTRODUCTION

The concept of learning has developed to be much more than a classroom, textbook, and institution. In the modern world, individuals acquire new skills by watching YouTube videos, browsing forums, working

on projects, and by their daily experiences. Nonetheless, despite the abundance of such digital resources at our fingertips, there are still so many people who reach dead ends with them: courses are expensive, no one-on-one mentor, and the content does not really match the local needs. We live in a world where our own local neighborhoods are full of untapped potential: the best students who pass exams, technology experts with niche expertise, prolific artists, and seniors with wisdom. The catch? There is no painless, sure method of connecting these specialists and the willing students in the neighbourhood.

That is how SkillXChange has entered the picture, an intelligent AI-based skill-to-skills exchange located in your own neighborhood. Cash is long gone; users sell what they are familiar with to get what they want to master and creating a real give and take. AI eliminates the guesswork of pairing up people. It penetrates your interests, time, the level of expertise, and the precise place to give you ideal matches nearby. It not only makes the learning more sharp, but also causes true local connections and creates trust between the neighbors. SkillXChange does even more by bringing communities closer together. Face to face communication is better than an impersonal internet-based course where it fosters friendship, support one another, and feeling of belonging. With guests close at hand, learners are guaranteed of sharing their strengths in a secure and safe environment. Simply stated, SkillXChange is an educational innovation: grassroots, fair, and driven both by technology and people. It opens possibilities to students, job seekers, and anyone marginalized due to any formal structure, creating self-sustainable knowledge centres that become self-reliant at the local level.

II. LITERATURE REVIEW

Conventional crowdsourcing websites, including Upwork, do not prioritize skill development over getting the task done, which restricts possibilities of the beginner employees to develop their skills. The authors present a web-based service called Atelier built to help support a micro-internship approach to mentorship, in which less-experienced workers are guided through paid projects by more experienced crowd workers. In order to determine whether this model was feasible, the researchers undertook a survey on Upwork as a way of establishing the obstacles to the growth of skills among crowd workers. Thereafter, they applied a field experiment in which they compared the mentorship-based approach with a non-mentored counseling [1].

A. Skills Exchange and Peer-to-Peer Learning.

Community-based learning, and skill exchange platforms that a system have received a lot of attention in the recent past because of their capacity to facilitate the inclusive, collaborative, and accessible learning has recently attracted considerable focus, given their aptitude to encourage the inclusive, collaborative, and accessible learning. The literature has investigated peer-to-peer learning patterns, community-based education programs, and online technology that has helped people to exchange knowledge outside the university setting.[8] The use of artificial intelligence in personalization of learning, recommendation and matching users to enhance engagement and effectiveness in learning have also been explored in a few studies. The reviewed section discusses available literature connected to peer-to-peer skills exchange, community-based learning, AI-based skill matching, and inclusive learning technologies that constitute the core of the suggested SkillXChange framework.[7][8]

B. Community and Neighborhood-Based Learning Systems.

The community-based learning has been identified as a significant method of enhancing cooperation, trust, and long-term involvement. According to research, learning environments at the neighborhood level promote accountability and increased social bonds through the fact that the participants have similar cultural and social conditions. Informal education is also backed with localized learning as it helps in a

practical interaction and in developing practical skills. Nevertheless, in spite of these benefits, the current digital learning platforms do not give special attention to organized neighborhood-based skill sharing. According to the literature, there is evident disparity in systems that effectively arrange and scale the learning in local communities.

C. Skill Matching and Learning Personalization Artificial Intelligence.

The concept of artificial intelligence has been utilized more in the field of enhancing personalization in online learning platforms. The past researches indicate that AI-based recommendation and matching systems can improve the user engagement by taking into consideration a variety of factors, including interests, availability, learning objectives, and learning behavioral patterns. Intelligent skill matching in peerlearning settings is important in determining the compatibility between the learners and the mentors, which results in enhanced learning performance. Although AI has been widely applied in content recommendation, little study is done on its application in supporting the localized and human-to-human exchange of skills [3]

D. Social Impact and Inclusion Learning Platforms.

The purpose of inclusive learning is to make talent acquisition opportunities equal irrespective of social economic status. Social technology studies contain insights that social platforms that support collaboration and mutual contribution enable individuals and promote life-long learning. The systems of skill-sharing in accordance with the theory of inclusivity assist people in lessening reliance on the formal education system and give a chance of informal knowledge sharing.[5] Available literature confirms the premise that the combination of AI technologies and community-based and non-monetary approaches to learning has the potential to create long-lasting and socially meaningful learning environments. SkillXChange is based on these learnings and integrates AI-driven skill matching with inclusive learning in the neighborhood. In general, the literature review shows the increasing significance of peer-to-peer learning, learning within communities, and artificial intelligence applications to improve learning experiences.[4] Although available literature shows that models of skill-sharing and AI-driven

personalization are effective, the majority of the current platforms are oriented to global or content learning and pay little attention to local collaboration among localities. The difference in the integration of inclusive non-monetary exchange of skills in an intelligent matching system that views user preferences and community situations is also noticeable. Such constraints imply that there is a necessity of a common framework that will integrate AI enabled skill matching with community-based learning. SkillXChange will fill this gap by providing inclusive and neighborhood-based skill exchange through intelligent suggestions.[3][2]

III. SYSTEM ARCHITECTURE AND METHODOLOGY

1. System Architecture

SkillXChange is an Internet-based project, which aims at matching the needs of those people who wish to acquire a new skill with those who can instruct them. The system is designed in such a way that it is simple, secure, and easy to use, besides being flexible to add upgrades in the future. Layers of the System The platform consists of five major components:

- Frontend (User Interface):

The frontend is made with React and tailored with Tailwind CSS. It offers the customer pages to create accounts, view skills, take classes, and maintain their profiles. The frontends use APIs to communicate with the backend to receive and provide information in real-time.

- Backend (Server):

The back-end is developed on the basis of Node.js and Express. It deals with the authentication of users, the management of skills and courses, enrollments and user notifications. This section is all about the smooth running and safeness.

- Database:

MongoDB is used to store all the significant data, including user profiles, courses, details on skills, enrolment records and feedback. Its dynamic nature enables us to make additions to it in the future with ease.

- Authentication:

Firebase Authentication is employed to control the user registration and login safely to ensure the system is not accessed by unauthorized users.

- Integration:

The system will have the ability to integrate with any other services, such as payment gateways of the premium courses and email or notification systems to ensure the user kept informed.

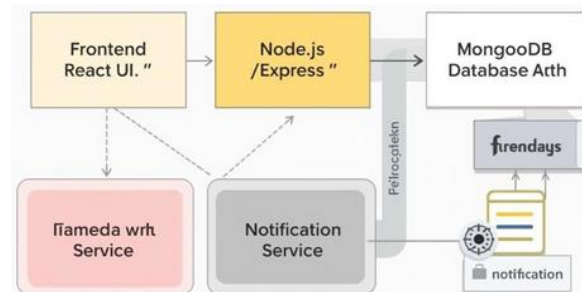


Fig. 1. Architecture Diagram

2. Component Interaction

The components in SkillXChange have a stratified communication. The interaction of the users is received by the frontend, which collects the requests and sends them to the backend. The backend accepts requests and interacts with the database, and provides business rules. The data is stored and accessed in the database whenever necessary. Authentication and session control will be done using firebase to deliver safe access. Notifications and other external services Backend processes enable notification and other external services that notify the users of updates.

3. Key Design Considerations

- Modularity:

Each layer is independent and as such it is simple to update and maintain. To provide an example, the front-end does not have to be upgraded at the cost of the backend APIs.

- Scalability:

MongoDB can be horizontal scaled to meet the increasing users and data.

- Security:

Authentication and role-based access eliminates the illegal retrieval of sensitive information by other users.

- Responsiveness:

React and Tailwind provide responsiveness of the site across the devices.

- Future-ready:

The architecture is comfortable with the future and can easily add new functionality, such as AI-based skill suggestions, payments, or advanced analytics.

4. Data Flow (Overview)

To log in, Firebase Auth is being used. Skills browsing or course enrolment can be requested using frontend requests. The backend will be responsible to authenticate requests and also communicate with the database to retrieve or update data. Mentor and user updates activate notifications. Response is given to frontend users thus making it to be smooth and interactive.

Proposed AI Model and Algorithm

AI Model Used This proposed system also makes use of Content-Based Recommendation Model that is adopted through a rule-based intelligent matching approach. The system does not depend on sophisticated machine learning models to provide personalised recommendations; it uses user profile characteristics, including skills, location, preferences, and activity level to create personalised recommendations. This is a lightweight, transparent, and real-time application. The model will determine the most applicable tutors or learners in the same neighbourhood by determining a similarity score of each possible match.

Users who have a higher similarity score are ranked higher and shown. There is the recommendation engine and its recommendation score is followed by weighted scoring system in which each user attribute has got a contribution towards the overall recommendation score. The weights are allocated according to the weight of each factor where, locality and compatibility of the skills receive a high priority. Attributes to be used in Matching. Proximity of neighbourhood / location. Similarity of skills (exact or partial match) User role (learner or tutor) Interests and preferences of the users.[6]

Location compatibility score between two users. S: Skills similarity rating on the basis of skills offered and demanded. I: Interest alignment score which is a measure of learning preferences. A: score on activity

status of user engagement level. W, W, W, W 1: Weights of each of the corresponding parameters. The total recommendation score R is calculated as weighted total of the following factors.

The overall recommendation score R is computed as a weighted sum of these factors:

$$R = (W_l \times L) + (W_s \times S) + (W_i \times I) + (W_a \times A)$$

The weight corresponds to the relative weight of the factor represented by the weight. The greater the value of R, the greater the level of relevance and strength with which the users can exchange their skills. This weighting scoring scheme enables the system to produce personalized, equitable, and explicable suggestions, which facilitates the inclusivity and community-based learning.

Table 1. Representation

Step	Component	Description
1	User Profile A	Contains user's skills, interests, location, and activity status
2	User Profile B	Contains potential match's skills, interests, location, and activity status
3	Feature Extraction	Relevant features such as skills, interests, geographical proximity, and engagement level are extracted from both profiles
4	Feature Scoring	Individual scores are assigned for Location (L), Skill Match (S), Interest Match (I), and Activity Status (A)
5	Weighted Matching Algorithm	Each feature score is multiplied by its assigned weight to calculate overall relevance
6	Recommendation Score (R)	A final relevance score (R) is computed by aggregating all weighted feature scores
7	Top Matches	Users are ranked based on R, and the best skill exchange matches are recommended

1. Development Approach

The development of SkillXChange follows a structured approach to ensure that the platform is efficient, user-friendly, and reliable. The methodology explains how the system was planned, designed, implemented, and tested.

2. Tools and Technologies

The following tools and technologies were used for development:

- Frontend: React for dynamic user interfaces, Tailwind CSS for responsive design
- Backend: Node.js with Express framework to manage server-side logic and API requests
- Database: MongoDB for storing user profiles, skills, courses, and enrollments
- Authentication: Firebase Authentication for secure login and registration
- Version Control: Git and GitHub for managing code and collaboration.



Fig. 2. Textual Workflow Diagram

IV. RESULTS AND DISCUSSION

The SkillXChange platform was introduced and tested to examine its usefulness with respect to peer-to-peer exchange of skills amongst students. The system has been tested on a small sample of the users that mostly included college students who interacted with various features that included user registration, skill listing, skill searching, and skill exchange requests. The general outcomes indicate that the platform has managed to fulfill its main mission of linking the learners with the providers of the skills in an easy and freeway. The concept of skill exchange was not difficult to comprehend to most users and they expressed desire to be actively involved.[7]

Table 2. Data Representation

User Role	Number of Users	Percentage (%)	Description
Learners Only	120	30	Users who participated solely as learners.
Skill Providers Only	80	20	Users who contributed only as skill providers.
Both Learners and Skill Providers	200	50	Users who engaged in both learning and teaching activities, demonstrating mutual knowledge sharing.
Total	400	100	Overall user distribution in the system.

The conventional crowdsourcing tools, e.g., Upwork, usually emphasize the completion of the task over developing the skillset, which does not provide an opportunity to novice workers to enhance their skills. The authors present Atelier, a web application that helps in obtaining micro-internships based on mentorship, i.e., a more experienced crowd worker helps a less-experienced one through a paid project. The researchers used a survey of Upwork to determine barriers to skill development of crowd workers in order to determine the viability of this model. They followed by a field experiment which compared the approach based on mentorship and a nonmonitored one [1].

The other significant outcome was system performance. The site was fast in responding to user information like searching skills and requesting. There have been no significant failures in the system and all the hard disk crashes or data loss during the testing process indicated that the system architecture is stable to use in small scale. The outcomes of the implementation and testing of the SkillXChange indicate the increasing necessity of alternative learning platforms that are based not on the paid education models but on collaboration.[3] Conventional learning systems tend to restrict the ability of students based on the high expenses and fixed design, where SkillXChange offers flexibility and inclusiveness. Among the most significant findings of Table 1, one can distinguish the fact that users are not afraid of being both learners and teachers at the same time. This helps to fulfill the main concept of SkillXChange, where all users are considered as very useful contributors. It is a peer-based solution that enables gaining confidence and giving a feeling of community among users.

This workflow aids in the realization of how the system has a systematic approach and at the same time is user friendly. The steps follow each other in the logical sequence eliminating confusion and enhancing user experience. This design option had positive impact on the usability and performance of the system.[9] Nevertheless, certain restrictions were also found in the discussion of results. As the platform depends on users to offer skills, the standard of learning will not be the same with each exchange. In the future, this problem could be solved by implementing the functions of skill verification, rating, reviews, and tracking of progress. To conclude,

the discussion secures the results by indicating that SkillXChange is a practical, user-friendly, and effective solution approach in terms of peer-to-peer sharing of skills. As it is refined and there is a greater number of users, the platform can have high opportunities to enhance the collaborative learning process and decrease the reliance on learning materials that are rather expensive.

V. CONCLUSION AND FUTURE WORK

This research project targeted on designing, developing, and testing SkillXChange, a peer-to-peer skill exchange platform that would enable the development of an inexpensive and cooperative learning experience. The primary objective of this platform was to bridge the gap between the learners and providers of skill by allowing them to exchange knowledge, without monetary dependence. Nowadays, the educational and professional environment is rapidly changing, and it is necessary to have access to practical skills, and SkillXChange simply and actively covers this demand.[10]

The results of the implementation and testing processes allow concluding the fact that SkillXChange is effective in fulfilling its main goals. Users could easily create profiles that were based on skill and were in a position to interact with each other in a way that was helpful in learning and teaching. The platform motivated users to be active learners and not passive consumers of learning content. This model was peer-driven and it assisted in developing confidence within users because they knew that their current knowledge also can be valuable to other users. It turned out that the system was flexible and did not only promote technical skills, but non-technical ones as well. The exchange of technical skills like the programming fundamentals, web development and software tool were the order of the day and non-technical skills like communication, presentation skills and academic guidance were also on the demand.

This indicates that SkillXChange is not restricted to a particular field and can be used to facilitate a variety of learning requirements. The easy-to-use interface and plain workflow were significant in ensuring that the platform was easy to use even by first time users. Effectiveness of community-based learning is another conclusion that has been drawn due to this research. SkillXChange encourages cooperation, confidence,

and self-development among the users. The platform is designed in such a way that there is cooperation as opposed to competition resulting in a more collegial learning culture. The good user interaction witnessed during the testing process is an affirmation that the learners would be interested in knowledge sharing given the right platform. The existing version of SkillXChange has some limitations despite being successful. Given that the platform greatly relies on the user input, the quality of learning can be different among various skill exchanges.

This underscores the fact that more mechanisms should be put in place to ensure consistency and reliability in learning outcomes. The solutions to these shortcomings are a significant part of the future development. Regarding the future employment, a number of improvements can be offered in order to enhance the effectiveness of SkillXChange in its entirety. The introduction of a rating and feedback system would be one of the main improvements as the users would be able to assess the skill providers following each exchange. This would aid in the cost of quality maintenance, develop trust, and promote responsible sharing of knowledge. In addition to this, the use of skill verification mechanisms can be introduced so as to check the user to make sure that they are skilled as they purport to be. Certification or digital badges can also be another crucial addition in the future. Such credentials may be granted upon effective completion of exchanges of skills and this will offer the learner with concrete evidence of the learning. This would make the users more motivated and would also allow the learners to demonstrate their abilities in the academic or work field. It is also possible to improve the platform with the help of real-time communication tools, e.g., live chat or video conferencing, to facilitate more interactive learning process. The creation of a mobile application of SkillXChange would also add more access and enable the users to learn and teach simultaneously. The future versions can also look into advanced technologies. [11]

The skill matching and recommendations with the help of Artificial Intelligence will allow users to locate the appropriate learning partners more effectively according to their interests, learning history, and goals. User engagement and how to increase the performance of the system in the long-run can be tracked using data analytics. Lastly, its social impact would be greater

were SkillXChange to be expanded and made applicable to larger communities, institutions, and regions. The platform can also be enhanced by partnering with educational institutions and learning communities to enhance its credibility and reach. To sum up, SkillXChange is a worthy initiative toward inclusive and community-based learning. As the platform keeps on improving and being enhanced in the future, there is a great potential of the platform becoming scalable and effective as a skill development and lifelong learning solution.

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