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NextGenHire: Gamified Learning With Skill-Based Job Matching

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Abstract- Gamification is changing how online learning works. When we add points, badges, levels and progress tracking, students feel more interested and complete topics on time. In this paper, we show NextGenHire, a simple system that mixes gamified learning with job recommendation.In this system, a student first logs in and creates a profile with their skills. After that, the student watches learning content like web development or app development. When the learning part is over, the student gives tests. In the test, the gamification part starts where the student gets points and results based on quiz accuracy, time taken and activity. After tests, the system checks the student's skill performance and compares it with job requirements. Using this method, the system recommends suitable jobs for the student. We also use basic data and simple comparison to check if gamification helps students to stay active and learn better. From this, we observed that students show better engagement after adding gamification.Overall, NextGenHire helps students learn and also suggests jobs based on their skills and performance, reducing the gap between learning and hiring.

Keywords— Gamification, Artificial Intelligence, Skill As- sessment, Recruitment, E-Learning, Job Matching

I. INTRODUCTION

Gamification is receiving significant attention because it's a proven method for boosting motivation, increasing learner engagement, and ultimately improving academic performance in educational settings [1]. When elements like rewards, interactive challenges, and points are incorporated, students naturally become more active participants and manage to keep their concentration sharp.

This positive trend is consistently reinforced by recent research. A study by Ortiz-Rojas and colleagues (2025) found that carefully structured game elements dramatically enhanced both engagement and the ability to grasp concepts in chal- lenging STEM courses [1]. Furthermore, research led by Subiyantoro (2024) observed that integrating reward-based and interactive components into online platforms increased student retention and motivation [2].

Srinivasa et al. point out that gamified learning doesn't just keep students interested; it actually helps them think more clearly and learn more efficiently when combined with adaptive assessments [3]. In real classroom settings, tools like Kahoot! have shown that simple game-based activities can boost students' motivation and get them more involved in lessons [4]. Another study by Cui and his team adds that using gamified platforms online helps learners stay focused and ultimately improves their overall performance [5]. Other researchers confirm that models emphasizing discovery and gamification encourage active involvement and exploration, which supports students in achieving higher academic results [6]. It is also important to note that various studies stress the necessity of ensuring fairness and cognitive validity within game-based assessment tools, particularly when used in edu- cational evaluations and recruitment processes [7, 8].

Even earlier findings support these outcomes: Gaonkar et al. (2022) demonstrated that applying gaming principles creates a measurable impact on learning and development, resulting in greater interest and improved academic achievement [9]. Col- lectively, prior research confirms that when designed correctly, gamification has the power to transform traditional education into an experience that is far more meaningful, data-driven, and engaging.

II. LITERATURE REVIEW

In 2025, a study by Ortiz-Rojas et al. closely examined how leaderboard-based gamification affected a university calculus course. Their mixed-method analysis showed that students who used the leaderboards not only performed better but also participated far more actively than their peers in traditional class settings. Crucially, however, the research also highlighted that these competitive elements did not significantly boost students' self-motivation or internal confidence. This finding strongly suggests that leaderboard systems require careful alignment with the actual needs of the student body.

Shifting focus to cognitive factors, Cui et al. (2024) ana- lyzed social, motivational, and cognitive elements influencing online learning success and discovered that motivation was the most powerful predictor of achievement. Their findings clearly underscore the need for e-learning platforms to prioritize motivational support if they want to maximize user performance. Meanwhile, Srinivasa and colleagues (2024) unveiled a gamified framework for critical thinking that leveraged cutting-edge AR/VR environments. Their controlled experimental data demonstrated major improvements in both engagement levels and advanced, higher-order thinking skills when compared to standard teaching methods.

Shenoy and Kumar (2024) explored the synergy created by combining model-based learning with gamification specifically for design education. Their work revealed that using rewards, compelling visuals, and interactive activities successfully helps to boost creativity, conceptual understanding, and the students' overall interest in the subject matter.

In other developments from 2024, Subiyantoro et al. successfully engineered a gamified Learning Management System (LMS) based on the foundational ADDIE model. This new system incorporated points, competitive leaderboards, and various challenges. Testing the LMS with university students showed a clear increase in both motivation and participation, despite researchers noting some technical issues.

Khaldi et al.'s systematic review in 2023 offered a powerful conclusion: gamification is most effective when its elements are meticulously adapted to the unique profile of each individual learner. They stress that while conventional features like points and badges do increase basic engagement, true effectiveness hinges on personalized, well-thought-out implementation.

Focusing on a specific tool, Zainudin and Zulkiply (2023) investigated the success of the Quizizz platform in business-education classrooms. Their study highlighted that features such as instant scoring, point-based rewards, and interactive question formats truly made learning more enjoyable for the students. These gamified elements actively encouraged participation and drove deeper engagement with the content. The researchers ultimately concluded that Quizizz not only uplifted motivation but also improved cognitive involvement, enabling students to better analyze and understand their subject matter.

Gaonkar et al. (2022) specifically looked at gamification within corporate training and development environments. They determined that structured game elements—such as progress tracking, timely feedback, and competitive challenges—are essential for influencing learner performance. These elements, they argue, help cultivate a more stimulating learning atmosphere where individuals feel genuinely encouraged to achieve their goals. They also confirmed that properly designed gamified tasks can significantly improve both motivation and learning outcomes when tied to clear educational objectives [9]. Looking back, Pireva-Nuci et al. (2021) explored the impact of introducing short digital quizzes during online lectures.

Their research demonstrated that these quick, interactive assessments were highly effective at helping students maintain attention throughout the session and remain actively involved. The immediate feedback provided by the quizzes reinforced important concepts and supported better understanding. The study concluded that integrating simple gamified tools like these into virtual classrooms can significantly enhance student retention and the overall learning experience.

Garc´ıa-Iruela et al. (2020) examined the effects of adding competitive elements to programming tasks. Their findings showed that students in the gamified groups exhibited significantly higher enthusiasm and participation compared to those in non-gamified settings. However, the authors also cautioned that the final impact on learning is heavily dependent on the design quality of the activities. When tasks were thoughtfully planned and closely aligned with defined learning goals, students showed both improved performance and better engagement.

Table 1: Literature Review Summary

Sr.	Author & Year	Title & Methodology	Key Findings
1	Maraza-Quispe et al. (2024)	Impact of Gamification on Collaborative Learn- ing Methodology – Experiment with 30 students us- ing a gamified platform.	Improved teamwork, communication, and responsibility.
2	Wang et al. (2024)	Impact of Gamified Learning Experience on Online Learning Methodology – Online survey with statistical analysis.	Gamification increased engagement and learning performance.
3	Shenoy & Kumar (2024)	Platform for Model-Based Learning and Gamification Methodology – Prototype tested on 95 students via surveys/interviews.	Enhanced creativity, motivation, and problem-solving.

4	Chen, Liu & Fang (2024)	Gamified Learning Framework for Critical Thinking Methodology – Conceptual model developed through literature review.	Supports critical-thinking and higher-order skills.
5	Uma Shankar et al. (2024)	Gamification in Recruitment Processes Methodology – Mixed- methods: case studies, interviews, surveys.	Improved engagement and candidate experience.
6	Subiyantoro et al. (2024)	Developing a Gamified LMS Using ADDIE Methodology – R&D study with 112 students using ADDIE.	Engagement rose from 77.8%→91.43%; better motivation and collaboration.
7	Aldalur et al. (2023)	Gamification and Discovery Learning Methodology – Case study using Wooclap and WebQuest activities.	Higher motivation, participation, and academic performance.

III. METHODOLOGY

1. System Workflow

The workflow of the proposed NextGenHire system follows a structured and modular sequence of operations, ensuring smooth interaction between learners, the AI engine, and recruiters. Each stage focuses on engagement, assessment, and skill-based matching to maintain fairness and efficiency across the platform.

Profile Setup: The Profile Setup module serves as the starting point of the system. In this stage, the user creates their profile by entering essential details such as name, educational background, skills, interests, and career goals. This information helps the platform under- stand the user's learning preferences and professional objectives. The collected data acts as the foundation for personalizing content and recommendations throughout the learning and hiring process.

Module Overview & Content Delivery: Once the profile setup is completed, the user moves to the Module Overview and Content Delivery stage. Here, the system provides access to various learning modules that cover relevant topics and skill areas. Each module includes structured lessons, tutorials, and exercises designed to enhance the user's knowledge. The content delivery is adaptive, meaning it adjusts to the user's existing skill level and learning speed to provide a personalized learning experience.

Gamification Engine: The Gamification Engine adds an engaging and motivational layer to the learning pro- cess. It incorporates game-like elements such as points, badges, levels, leaderboards, and rewards. This approach makes learning more interactive and enjoyable while encouraging users to complete tasks and participate actively. The gamification system also tracks the user's progress and performance, which later contributes to skill assessment and evaluation.

Skill Evaluation: The Skill Evaluation module plays a crucial role in assessing the user's performance based on their participation in modules and gamified activities. It analyzes the user's quiz results, completed tasks, and overall engagement to determine their proficiency level in different skill areas. The evaluation results are then used to measure growth and identify areas for improvement. This data is passed on to the next module for personalized analysis and recommendations.

Skill Level & Personalized Job Reference: In the Skill Level and Personalized Job Reference stage, the system interprets the evaluation data to identify the user's skill levels and strengths. Based on these insights, it provides customized job references and opportunities that align with the user's capabilities and interests. The module also suggests learning paths or modules that can help the user strengthen weaker skills, ensuring a balance between learning and career growth.

Recommender: The Recommender module is the final stage of the workflow. It utilizes artificial intelligence or machine learning algorithms to suggest relevant learning materials, job opportunities, and career paths tailored to the user's skill set and performance data. The recommender continuously updates its suggestions as the user progresses, ensuring ongoing development and alignment with changing industry needs. This module effectively connects learning outcomes with real-world career opportunities, completing the cycle of personal- ized learning and professional growth.

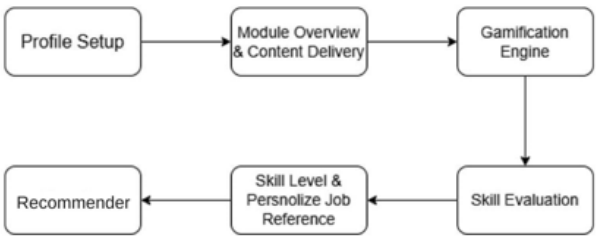

Fig. 1: Workflow of the proposed NextGenHire system showing the interaction between learners, gamified learning modules, AI-based analysis, and recruiters.

Mathematical Model

We model the proposed system NextGenHire formally as:
S = {I, F, O, A}
where inputs (I), functions (F), outputs (O), and assump- tions (A) are defined as follows.

Inputs (I):

I = {I1, I2, I3, I4}

- I1: Learner registration details — name, academic profile, and preferred skill domains.
- I2: Recruiter job requirements — skill criteria, experience levels, and job category.
- I3: User performance data — quiz scores, accuracy, completion time, consistency.
- I4: Engagement metrics — number of logins, learning streaks, and badge count.

Functions (F):

F = {F1, F2, F3, F4, F5}

- F1: Authentication Function — validates user identity through secure Firebase and JWT protocols.
- F2: Gamification Function — converts user activity into game-like rewards such as badges, levels, and leaderboard rankings.
- F3: Performance Evaluation Function — calculates learning accuracy, quiz completion speed, and engage- ment frequency.
- F4: AI Skill Analysis Function — uses machine learn- ing algorithms to generate a composite SkillScore from performance data.
- F5: Job Matching Function — compares learner SkillScores with recruiter job requirements to generate ranked recommendations.

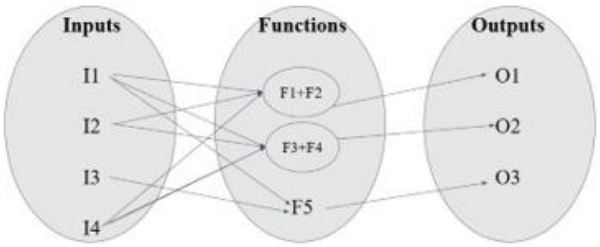

Fig. 2: Venn diagram representing the relationship among AI Evaluation, Gamification, and Recruitment Modules in the NextGenHire framework.

SkillScore (Mathematical Model): The SkillScore quan- tifies the learner's capability using a weighted combination of measurable performance parameters:

Assumptions (A):

- A1: User data (quiz scores, time logs) are accurate and free from manipulation.
- A2: Recruiter-defined job requirements are valid and well-structured.
- A3: Internet connectivity and database synchronization remain stable for real-time processing.
- A4: Gamification incentives positively influence consis- tent participation.

Statistical Analysis

This part is made using the 7 papers which are written in Table 1 (literature review).
SkillScore = w1A + w2B + w3C
where:

- A = Accuracy in quiz or task performance
- B = Average completion speed (inverse proportional)
- C = Consistency based on engagement and improvement trends
- w1, w2, w3 = Weighting factors where $0 \leq wi \leq 1$ and $wi = 1$

The SkillScore is normalized to a 0–100 scale for compari- son and ranking. A threshold-based reward function is applied as follows:

$S \geq 80 \Rightarrow$ Award Badge or Level-Up
Level = Total Points
100

These equations ensure that learners are rewarded fairly and consistently based on actual performance metrics rather than subjective assessment.

Outputs (O):

O = {O1, O2, O3}

- O1: Generated SkillScore report and badge list for each learner.
- O2: Job recommendations ranked by AI matching algo- rithms.
- O3: Dashboards displaying learning trends, progress an- alytics, and recruiter insights.

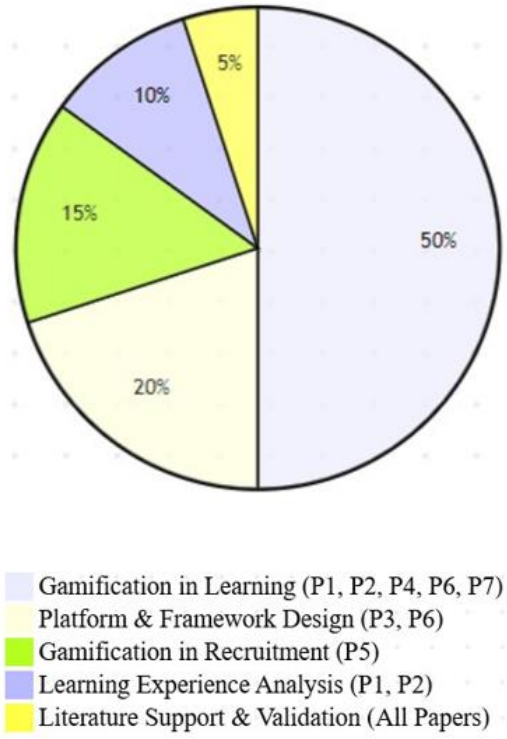

Fig. 3: Research Contribution Analysis Diagram

IV. IMPLEMENTATION

Frontend: The frontend of NextGenHire provides a responsive and user-friendly interface for learners and recruiters. It successfully displays learning modules, quizzes, leaderboards, badges, and real-time progress tracking dashboards. Users were able to navigate smoothly between modules, view instant feedback af- ter quizzes, and monitor their SkillScore visually. The gamification elements (points, levels, badges) were effectively reflected on the dashboard, increasing user interaction and motivation.

Backend: The backend of NextGenHire is developed using NodeJS with the ExpressJS framework to ensure efficient and scalable server-side processing. It success- fully handles user authentication, profile management, quiz evaluation, SkillScore calculation, and job recom- mendation logic. RESTful APIs are implemented to enable smooth communication between the frontend and the database.

Database Management: NextGenHire utilizes Mon- goDB as a NoSQL database to efficiently store and manage user profiles, quiz results, SkillScores, badges, and recruiter job requirements. The flexible document- based structure allows scalable data handling and fast re- trieval of records. This ensures smooth synchronization between learning activities and job matching processes.

Authentication System: The platform implements a se- cure authentication mechanism using JWT (JSON Web Token) and OAuth integration. Users can register and log in using email-password credentials or third-party providers such as Google and GitHub. This multi-layer authentication system enhances security, protects user data, and ensures controlled access to system resources.

Result

By using the MERN technology stack, we successfully developed and deployed the NextGenHire platform. The following figures illustrate the working modules of the system.

The system landing page serves as the primary entry in- terface of the NextGenHire platform. It presents the core branding elements, navigation menu, and access options for learners and recruiters. This interface provides a structured overview of the platform's key functionalities.

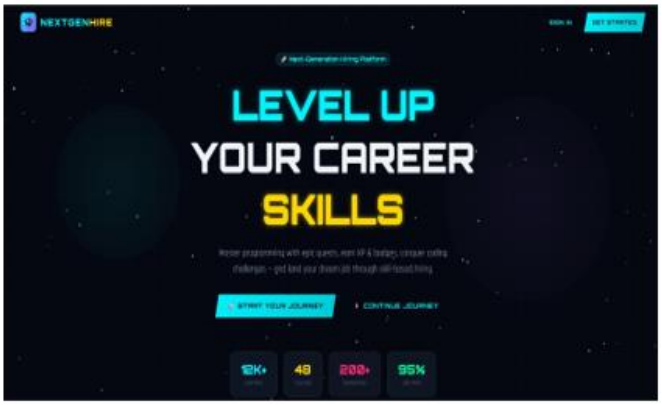

Fig. 4: System Landing Page

The user authentication interface enables secure access to the NextGenHire platform through credential verification mechanisms. It supports both traditional email-password login and third-party OAuth authentication such as Google and GitHub. This module ensures controlled access to personalized dashboards while maintaining data privacy and system security.

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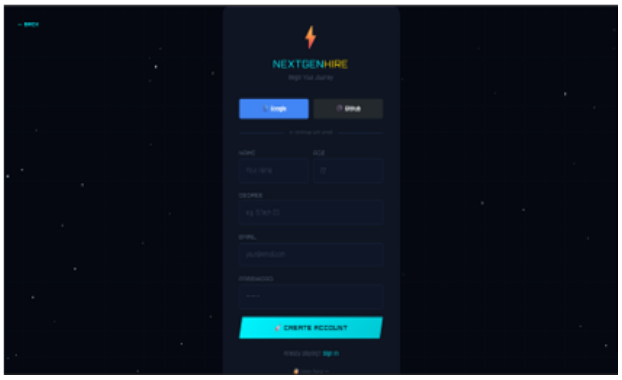

Fig. 5: User Authentication Interface

The user dashboard acts as the central interaction hub of the NextGenHire platform. It visually presents accumulated XP points, learning streaks, earned badges, and overall per- formance analytics. This interface enables users to monitor their progress in real time and stay motivated through gamified feedback.

Fig. 6: User Dashboard.

The course library module provides structured learning paths categorized by skill level and domain. It allows users to enroll in courses, attempt quizzes, and complete mini-projects integrated with a gamified progression system.

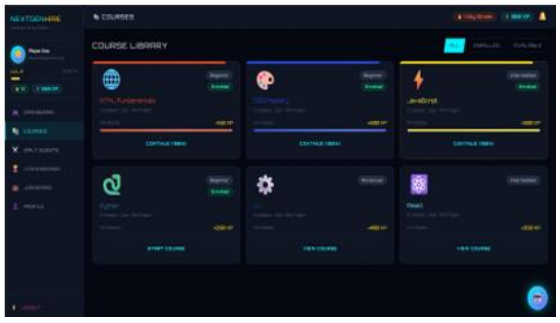

Fig. 7: Course Library Module .

The job board module connects learner skill development with real-world employment opportunities. It displays rele- vant job listings based on the user's SkillScore and profile information. This feature bridges the gap between learning and recruitment by enabling direct application through the platform.

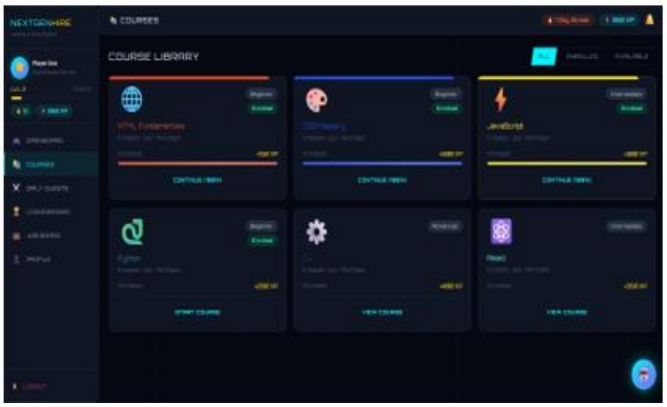

Fig. 8: Job Board.

Advantages

- Bridging Learning and Employment: NextGenHire unites gamified learning with AI-based recruitment into a single system. This connection ensures that every skill a learner gains through modules directly contributes to employability, making the transition from education to job placement smooth and meaningful.
- Sustained Engagement through Gamification: By applying points, badges, and leaderboards, the system encourages consistent participation and reduces dropout rates. Learners stay motivated because they receive immediate recognition for progress, fostering a healthy sense of competition and achievement.
- Objective and Fair Skill Evaluation: Traditional exams or interviews often include human bias, but NextGenHire's AI-driven analyzer evaluates users purely on performance metrics. This ensures that skill assess- ment is based on data, improving fairness and trans- parency in both learning and hiring.
- Real-Time Feedback and Analytics: The system pro- vides instant feedback on user activities, allowing learn- ers to identify their weak areas immediately. Recruiters can also view detailed analytics to better understand candidate capabilities, making decision-making more efficient.
- Enhanced Motivation and Confidence: Continuous progress tracking and visible accomplishments help boost learner confidence. As users see themselves im- proving through ranks and rewards, they gain intrinsic motivation

to learn more, perform better, and engage longer with the platform.

VI. CONCLUSION

The NextGenHire platform represents a new direction in digital learning and recruitment by merging gamification prin- ciples with artificial intelligence. It motivates learners through engaging game-based challenges, leaderboards, and performance rewards while ensuring that every skill is validated through structured assessments. The AI-driven skill analyzer transforms learner performance data into a measurable profile, making recruitment more accurate, unbiased, and data-backed. This combination of technology and psychology helps bridge the growing gap between education and employability in today's digital world. Looking forward, NextGenHire lays a strong foundation for personalized, transparent, and immersive skill development. As gamified learning evolves with technologies like AR/VR, blockchain, and adaptive AI, such systems will redefine how individuals learn, grow, and find opportunities. By turning education into a motivating experience and recruitment into a merit-based process, NextGenHire sta

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