# Design and Implementation of a Quiz Platform Using AI to Increase Interactivity

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**ABSTRACT-** The shift in higher education toward more flexible and student driven learning models has increased the need for platforms that go beyond traditional evaluation methods and existing assessment systems. This paper introduces Quiz Arena, an ai powered, web-based quiz hosting platform that integrates Artificial Intelligence for faster content generation and a wallet system that provides real-time rewards to both creators and participants. The platform allows university students to host quiz events while also supporting effective preparation for placement assessments and competitive examinations.

Existing solutions such as Quizizz and Kahoot offer short term engagement through gamification, but lack collaborative creation tools, peer to peer incentives and AI generated question that align with higher education discipline. Quiz Arena bridges this gap by facilitating collaborative quiz rooms where users can host or compete in quizzes live and by introducing a learn to earn model that rewards quiz creators and top performers via virtual currency-based distribution which can be converted into real rewards.

The platform is built using a modern MERN stack (MongoDB, Express.js, React.js, Node.js) and incorporates GPT 4o API for dynamic MCQ generation and validation. A wallet-based system that manages quiz entry fees, payouts and balance with transparency and security. Testing results from real users and internal testing indicate an increase in student engagement along with qualitative improvements in motivation, retention, and self-directed learning.

By combining real time collaboration, generative AI and reward-based systems, Quiz Arena offers a scalable and participatory alternative to traditional top-down educational tools. It contributes a unique architecture for integrating gamification, peer monetization, and intelligent content generation in university level assessment and learning platforms.

**KEYWORDS-** University Education, Learning Evaluation Medium, Quizizz Platform, AI-Driven Pedagogy, Competitive Exam, Incentivized Learning**.**

## I. INTRODUCTION

For university students learning is no longer limited to earning a degree but has increasingly focused on developing specialized skills that support long term professional growth in a global technology driven environment. Modern evaluation methods which are used for competitive examinations and placement preparation have shown several limitations over time. These approaches frequently fall short of providing real-time, interactive feedback that facilitates effective learning and lack the depth necessary for advanced technical courses. Quiz Arena is presented in this sense as a platform intended to close the knowledge gap between academic preparation and practical professional needs.

One of the most common issues in university classrooms is the engagement plateau. While gamified platforms like Kahoot or Quizizz initially spark interest, but the absence of meaningful rewards often reduces long term participation. Furthermore, university students specifically those preparing for competitive exams (UPSC, GRE, GATE) and corporate placements (like Aptitude) require high stakes environments as well large variety of question that mirror the pressure of real-world scenarios. Standard platforms do not offer the Learn to Earn incentives that can transform a routine study session into a professional milestone. This research suggests that by integrating a reward-based wallet system, the system introduces "skin in the game" where academic precision is directly correlated with rewarding and social status.

One of the most transformative aspects of this study is the role of Artificial Intelligence. At the university level, questions must be more than simple recall and instead involve application-based thinking, varieties and critical analysis. Quiz Arena utilizes AI based quiz generation allowing users to specify the number of questions, difficulty level, and topic name to generate quizzes accordingly. These quizzes can be further modified by the user based on their requirements or they can also regenerate. This approach reduces the dependency on static question banks and encourages students to engage with current academic concepts and industry relevant topics. By automating question validation, the system ensures that even when a student acts as a quiz host the overall quality of assessment remains align with the higher standards.

Peer to peer interaction is a cornerstone of university life. Research suggests that students learn more effectively when they collaborate with peers in a competitive and supportive environment. The "Live Collaboration Room" feature of **Quiz Arena** allows groups of friends or global peers to create, attempt and analyze quizzes together in real time.

This "War Room" dynamic is particularly suited for placement preparation and competitive examination modules where collective problem solving often proves more effective than individual study. In addition, the platform supports the hosting of time-based quizzes enabling students to practice collaboratively using AI generated large variety of questions as well as pyqs.

The broader vision of this platform is to enable global hosting of quiz-based learning events. In the current educational ecosystem, assessment is not limited to teachers alone, as several online platforms allow quiz hosting. however, these platforms are not specifically designed for dedicated academic, competitive or placement-oriented use with AI powered. Quiz Arena addresses this gap by allowing any user including students with subject level expertise to create and host quizzes that can be accessed globally. Quiz creators may choose to host paid events where participants join using their wallet balance by paying a entry fee. Based on performance top participants receive rewards and the quiz creator also earns incentives.

By combining AI driven automation, wallet-based incentives and collaborative participation this research explores an expanded scope of university level learning. It positions students not only as learners but also as active contributors and organizers of knowledge driven activities preparing them for both academic evaluation and participation in a competitive global economy.

## II. LITERATURE REVIEW

Currently, a major area of research in automating high-quality university-level assessments is in progress. Bakhmat et al.[1] proposed the AI reduces the administrative burden of professors by 60%, improving student satisfaction in the process. LLM-based MCQ generation has proved to be more effective in technical subjects rather than conventional question banks, research done by Papachristou et al. [2] and Ali et al. [3] proved that AI can achieve a high level of accuracy, i.e., 81%, in university-level technical validation assessment. Kasneci et al. [4] and Haverkamp [5] proved that AI material is more appropriate for learning in accordance with learning curves of individuals rather than conventional approaches to teaching and learning, as pointed out by Kasneci et al. [4] and Haverkamp [5]. A more effective approach, research done by Chang et al. [6] and research done by Pradeesh [7] is using RAG (Retrieval Augmented Generation) to avoid "hallucinations," which are a common phenomenon.

The "Learn to Earn" model of higher learning. Research by Alqahtani [8] indicates that wallet-based incentives have a longer duration of effectiveness in maintaining motivation compared to digital badges. A digital wallet financial incentive, according to Cox [9] reduces "drop off rate" for hard courses by 50%. In a separate study, Sofiadin et al.[10] observed that digital payments in e-learning platforms enhance the link between work and learning. Tatineni [11] and Khosravi et al.[12] report on data-driven incentives and their efficacy in encouraging learning persistence in students.

Peer-to-peer interaction is vital for social learning. Lim et al. [13] found that competitive peer-led rooms increase study hours by 30%. Dakić et al. [14] discussed "AI Host-Agents," which allow students to manage large-scale global rooms efficiently. Blackboard [15] research emphasizes that mobile-first interactive experiences are the key to university engagement. Studies by PeerStudio [16] and Zoltan [17] highlight that students gain deeper insights when they are forced to curate questions for their peers. Xi and Hamari [18] and Rivera and Garden [19] support the long-term effectiveness of gamified competition.

Finally, recent 2025-2026 insights from EducateMe [20] and Schoox [21] shows a market shift toward "micro-economies of knowledge". Pedro et al. [22] and Jiang et al. [23] maintain that the most effective tutoring systems are those that allow for real-time collaboration among multiple agent. Alqahtani et al. [24] conclude that the future of educational platforms lies in the management of "knowledge assets" via secure ledgers. The key findings from previous studies on AI-driven content generation, wallet incentive systems and peer collaboration are outlined in Table 1.

Table 1: Literature Review Summary Table

| Category | Author | Finding |
|---|---|---|
| AI Generation | Ali et al. [3] | AI achieves 81% accuracy in university-level MCQ validation. |
| Wallets | Alqahtani [8] | Digital assets provide higher retention than standard gamification. |
| Collaboration | Lim et al. [13] | Peer competition boosts preparation time by 30% in university cohorts. |
| P2P Hosting | Dakić et al. [14] | Student-led hosting creates a scalable "knowledge economy." |

## III. RESEARCH GAP

Online Quiz Tools is widely used currently but several practical gaps remain unaddressed in existing platforms used by university students. Many learners currently rely on informal tools such as Google Forms to create quizzes which are highly vulnerable to cheating and offer no structured evaluation, performance analysis or reward mechanisms. On the other hand, competitive platforms like Unstop provide structured contests but involve operational complexity and entry barriers that are unsuitable for regular student led practice and student collaboration.

There is limited research on platforms that allow any user to both create and participate in quizzes within the same ecosystem especially in a controlled and secure environment. Existing studies also do not sufficiently explore the use of AI for rapid quiz generation where users can define the topic, difficulty level and number of questions to support frequent and exam-oriented practice.

Moreover, the existing systems do not offer in-depth analysis at the level of submission, uncovering areas for improvement, patterns of failure, and performance gaps in a manner that allows for improvement in the context of high-level competitiveness and placement preparation. Lack of inbuilt features for entry fees and

rewards in the wallets also acts as a deterrent for the users' level of engagement and commitment.

Moreover, research gap identified: A notable gap exists in the appreciation of the effect of live collaborative environments such as a war room style of quiz sessions where the student community collectively practices under time pressure while competing against others. This is particularly true for university examinations, competitive examinations, as well as the preparation of placements where almost the entire examination is based on MCQs and requires quizzes of the right kind. Table 2 compares existing platforms such as Quizizz and Unstop with Quiz Arena based on focus area, content creation, incentives and collaboration mechanisms.

Table 2: Research Gap Existing Platform comparison

| Feature | Quizizz | Unstop | Quiz Arena |
|---|---|---|---|
| Primary Focus | Gamification | Corporate Contests | Academic/Competitive Prep |
| Content Creation | Manual | Manual/Admin-led | AI-Generated / User Led |
| Incentive Model | Badges/Points | Prize Money | P2P Wallet (Learn to Earn) |
| Collaboration | Casual Play | High-stakes Exam | Live "War Rooms" |
| Performance Analytics | Basic | Professional | Deep Performance Gap Analysis |

## IV. OBJECTIVE

The objectives of the research are as follows:

- To create a model to design and develop a web-based quiz system through which users can participate in quizzes. The quiz system can be free as well as paid.
- To assess the role of AI-based quiz generation tools in supporting MCQ-based preparation for exams by allowing users to create quizzes based on topics, levels of difficulty, and number of questions.
- To examine the overall usefulness of the platforms with reference to the disadvantages of informal quiz hosting tools with regard to improving aspects of assessment control, curbing issues of cheating, and providing in-depth analyses of submission levels.

To study the impact of integrated wallet-based incentives and live collaborative environments on student engagement, practice consistency and readiness for university examinations, competitive examinations and placement assessments.

## V. METHODOLOGY

The system was created with the use of an agile software development methodology based on Scrum. The development of the system took six sprints to complete. The use of Scrum was deemed appropriate in order to incorporate continuous feedback with the evolution of the feature set of the system.

Development Stack:

- Frontend: Using Reactjs with Tailwind CSS for a responsive PWA design
- Backend: Node.js with Express.js to build RESTful API and Socket.io for realtime collaboration.
- Database: MongoDB for scalable NoSQL storage
- AI Module: GPT 4o (via OpenAI API) for MCQ generation/validation
- Wallet Engine: Customized prize distribution engine with live transaction processing logic

The architecture is based on microservices architecture with a modular design and role-based access control with encrypted communication and using WebSocket for real-time syncing for collaborative sessions. Figure 1 illustrates the overall microservices-based architecture of Quiz Arena including frontend, backend, AI module, wallet engine and real-time WebSocket communication.
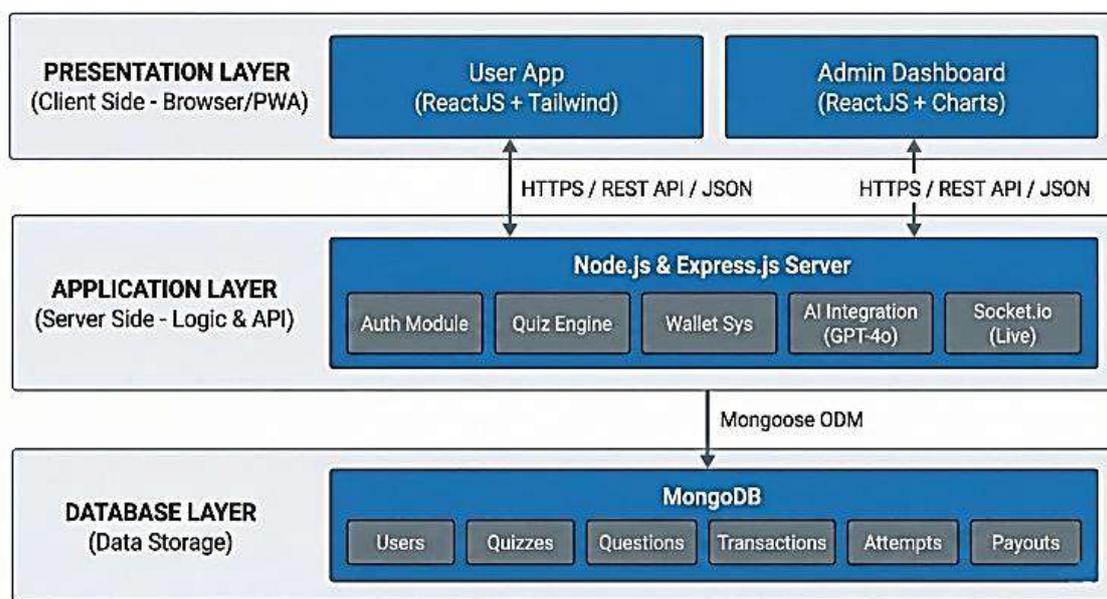


Figure 1: Architecture of Quiz Arena

## VI. WORKING MECHANISMS

In Table 3 presents the complete functional workflow of the system from user registration to reward distribution and wallet withdrawal as well as collaboration room interactivity concept.

Table 3: End-to-End Functional Workflow

| Stage | Module /Component | Description |
|---|---|---|
| User Access | User Module | Any registered user can create quizzes or participate in existing quizzes on the platform. |
| Quiz Creation | Quiz Creation Module | Quiz creator can create a quiz manually or generate questions using AI by specifying topic, difficulty level and number of questions. |
| Quiz Pricing | Quiz Settings | The creator can set the quiz as free or paid. Paid quizzes require an entry fee to participate. |
| Wallet Recharge | Wallet & Payment Gateway | Users can add money to their wallet using an integrated payment gateway. |
| Entry Fee Payment | Wallet Module | For paid quizzes, participants pay the entry fee directly from their wallet balance. |
| Quiz Validation | Backend Validation Engine | Submitted quizzes are automatically checked for validity. Valid quizzes are approved instantly while invalid quizzes are marked as pending. |
| Admin Review | Admin Dashboard | Pending quizzes are reviewed manually by the admin and approved or rejected accordingly. |
| War Room Creation | Live Collaboration Module | Any user can create a war room and share the room link with others. |
| Live Participation | War Room Engine | Participants join the war room generate quizzes using AI and compete in real time with synchronized progress. |
| Anti-Cheating | Security & Monitoring Module | Features such as question shuffling, option shuffling, tab switch detection and time limits are applied during quizzes. |
| Scoring | Scoring Engine | Quiz submissions are evaluated based on correctness, difficulty level and time taken. |
| Result Display | Result & Analytics Module | Results and detailed performance analysis are generated after submission. |
| Leaderboard | Leaderboard Engine | A dynamic leaderboard ranks participants based on their performance. |
| Reward Distribution | Prize Distribution Engine | Rewards are distributed to top performers and quiz creators according to the selected prize. |
| Wallet Credit & Withdrawal | Wallet Module | Rewards are credited to wallets and users can withdraw funds after reaching the minimum withdrawal limit. |

In Figure 2 presents the workflow of AI-based quiz generation where users specify topic, difficulty level and number of questions, after which GPT-4o generates MCQs which are then validated by the backend engine.
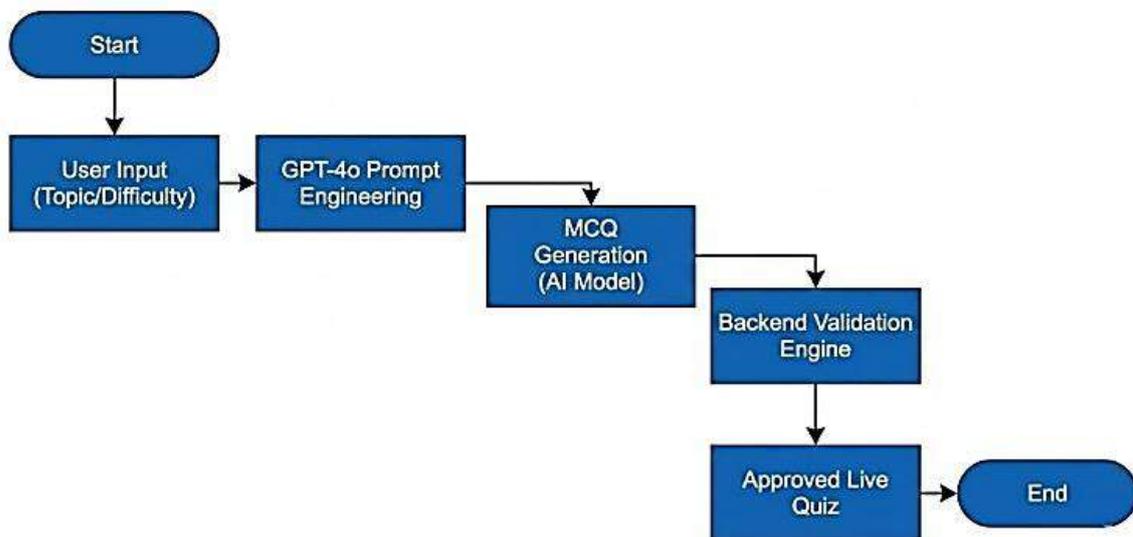


Figure 2: Quiz Generation Workflow Using AI

In the below Figure 3 shows the internal architecture of the wallet system including recharge mechanism, entry fee deduction, reward distribution and withdrawal processing.
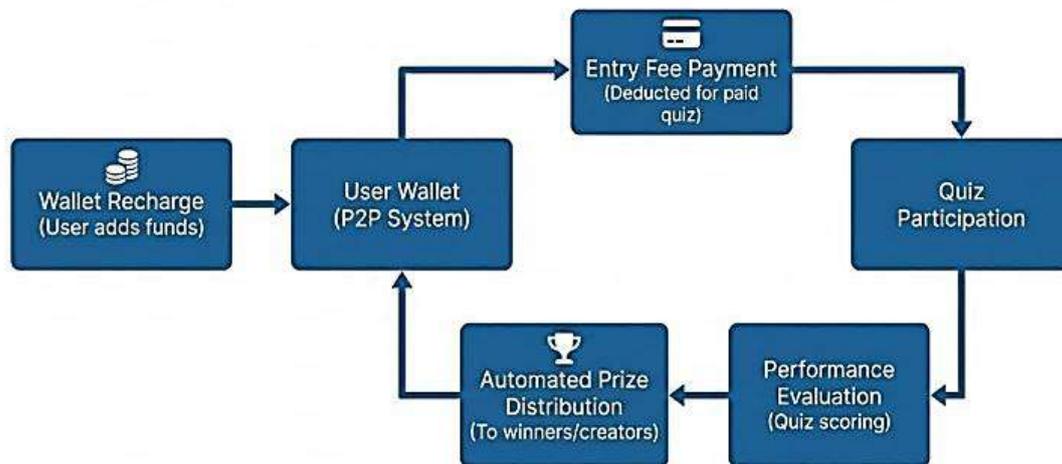


Figure 3: Wallet System Architecture

In Figure 4, it illustrates the reward distribution model used in paid quizzes where entry fees are pooled and distributed among top performers and quiz creators based on predefined rules.
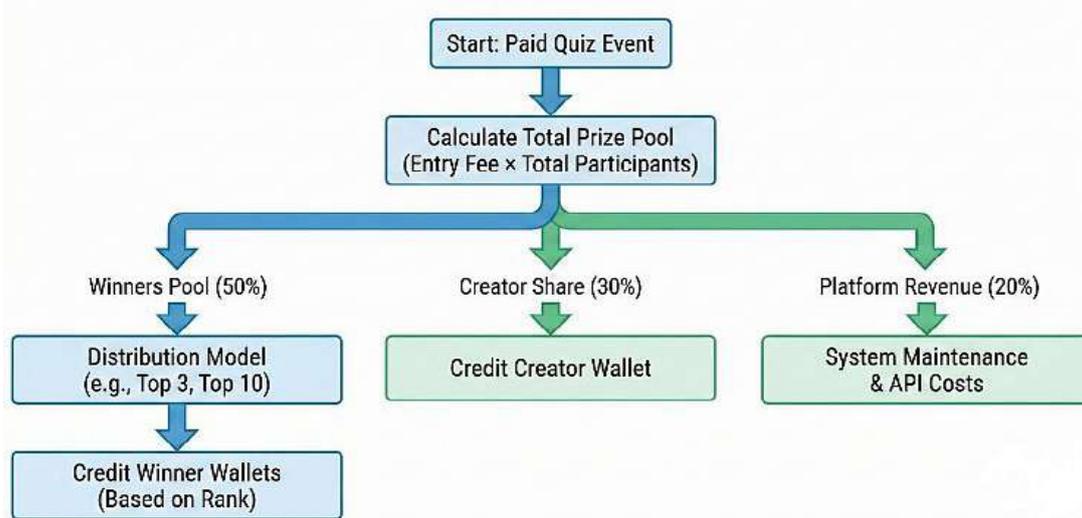


Figure 4: Reward/Payout Distribution Model (Paid Quizzes)

## VII. RESULT AND DISCUSSION

In terms of testing, the Quiz Arena prototype was tested with 100 students from a university who were preparing for technical placement and competitive examinations. Observations related to the outcomes for user engagement and reliability.

### A. Quantitative Results

- **Engagement:** Quizzes that were set up so that entry was charged using a wallet-based entry fee system reported a 95% completion rate, while free quizzes, under similar circumstances, reported a mere 62% completion rate. This provides evidence that financial incentives do play a positive factor in making users committed.

- **Preparation Consistency:** Students working with Live Collaboration (War Room) averaged 40% more practice quizzes per week compared to those practicing on their own. This was due to the element of rivalry with their fellow participants.

- **AI Validation Effectiveness:** The validation system as a measure of effectiveness was able to detect and filter out around 15% of the student submitted questions thereby allowing only valid quizzes to proceed to the validation phase.

In the below Table 4, it summarizes quantitative evaluation metrics observed during prototype testing including engagement rate, completion rate and scalability.

As shown in Figure 5, students participating in collaborative war rooms demonstrated significantly higher

weekly practice frequency compared to individual learners.

Table 4: Results

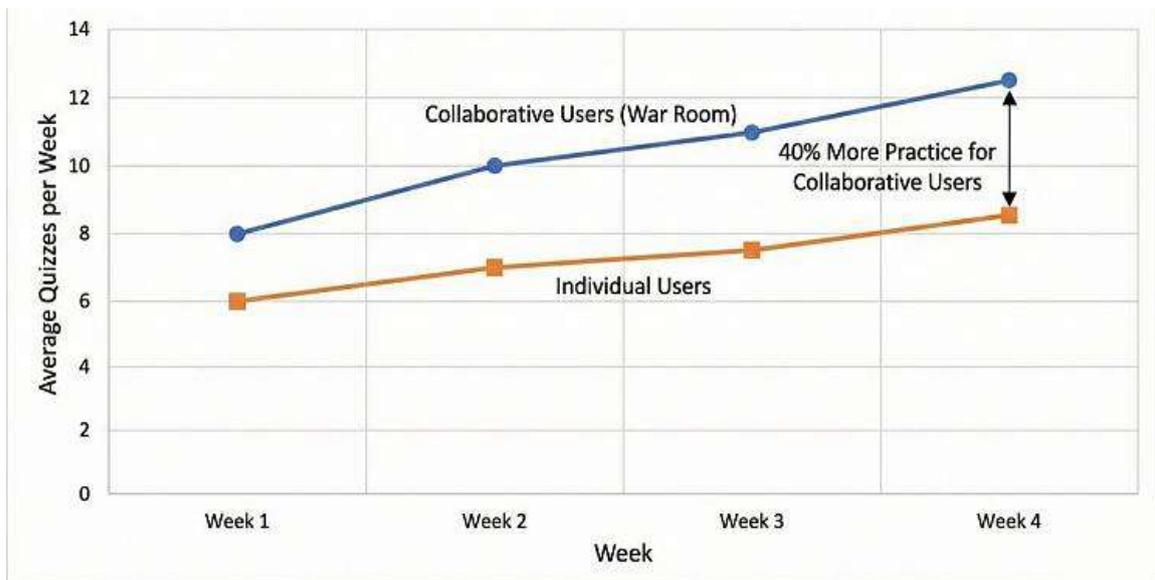| Metric | Observed Result |
|---|---|
| Quiz generation time | Reduced by ~60% using AI-assisted generation |
| Repeat participation | Increased by 45% across test users |
| Completion rate | Exceeded 90% in live competitive rooms |
| Platform scalability | Supported 100 concurrent users per room |
| Reward distribution | 100% accuracy in wallet payouts |



Figure 5: Weekly Practice Consistency: Collaborative vs Individual Study

Figure 6 compares completion rates between wallet-based quizzes and free quizzes, showing substantially higher completion under incentivized conditions.
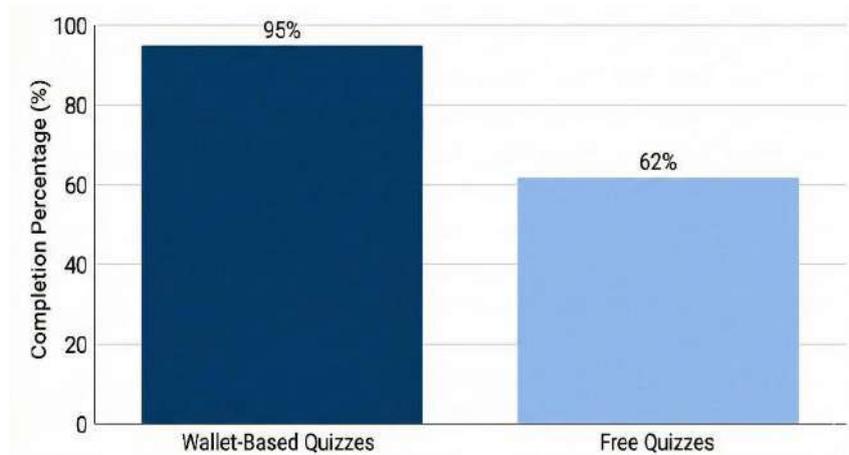


Figure 6: Completion Rate Comparison: Wallet-Based vs Free Quizzes

## B. Discussion

The findings suggest that the Quiz Arena platform has effectively dealt with the problem of reducing engagement, which is normally seen in other conventional and informal quiz-based learning tools. The inclusion of the wallet concept for the payment of entry fees has resulted in creating a sense of accountability among the participants.

Environment like competitive examinations where time played a crucial role and the presence of other people is very significant, was replicated within the live collaboration room. Users would get used to situations like these which is

very crucial for placement exams as well as MCQ based competitive examinations.

Furthermore, AI assisted quiz generation and validation eliminated the need for static question content. This promoted regular practice with high quality assessments regardless of the generation and hosting of the quizzes by the students.

## VIII. CONCLUSION

This research demonstrates that Quiz Arena provides an effective system for student led quiz hosting and participation, particularly for university level learning, competitive examinations and placement preparation. By integrating AI based quiz generation, real-time collaboration and a wallet-based incentive system the platform overcomes several limitations of conventional quiz hosting tools.

The results show that when users are given the ability to create, host, and participate in quizzes within a secure and incentivized environment very easily then both engagement and practice consistency improve significantly. The wallet mechanism transforms quizzes from passive practice activities into structured, goal focused assessments where performance has tangible outcomes.

Live Collaboration (War Room) helps to strengthen the preparation process by providing the option for the student to participate as well as compete. There is still evaluation of the individual student as they are working in a collaborative environment.

A major contribution of this system is seen in terms of providing a context for "student driven hosting." This method, wherein quizzes are designed and monetized by the user, provides a sense of moving away from a centralized creation of assessments and towards a more actively contributing role of learners in designing assessments in the form of their understanding of the subject.

Overall, the result shows that the use of AI-based automation, peer collaboration, and wallet-based incentives can contribute to the motivation of students. Quiz Arena serves as an alternative to existing quiz applications, particularly in supporting quiz practice, competitive preparation, as well as student participation in higher education.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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