Project Report

On

GenAI Interactive Learning Games

For

Intel® Unnati Training Program 2025

Submitted by

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1.Problem Statement

Develop an educational game platform that uses Generative Al to create dynamic content, challenges, and scenarios. The goal is to make learning more engaging by providing game elements (e.g., puzzles, quizzes) that adapt in real-time based on players' performance and interests.

2.Objective

1. AI-Powered Learning – Generate dynamic quizzes, puzzles, and stories in multi-languages.

2. Gamified Education – Enhance engagement with interactive challenges and adaptive difficulty.

3. Accessible & Scalable – Provide a mobile-only, interactive platform for all learners.

4. Multilingual & Cognitive Growth – Support language learning and critical thinking.

5. Personalized Learning Paths – Use AI to adapt content based on each learner's progress, strengths, and weaknesses.

6. Real-Time Feedback & Insights – Provide instant feedback to learners and track their performance through detailed analytics.

7. Community & Collaboration (Future Scope) – Incorporate features like peer challenges, group puzzles, and leaderboard rankings to promote social learning.

3.Abstract

The GenAI Interactive Learning Games project aims to revolutionize education by integrating generative AI into mobile-based interactive learning experiences. Designed for multilingual users , this app provides an engaging platform featuring AI-generated quizzes, puzzles, mini-stories as games. The primary objective is to enhance learning through interactive and personalized content, catering to diverse age groups and learning preferences.

Built using a no-code development approach, the app will support user accounts to track progress and adapt difficulty levels dynamically based on individual performance. The AI component will generate and refine educational content in real time, ensuring freshness and relevance. The puzzles and games will range from simple to complex, encouraging cognitive development, problem-solving skills, and language proficiency.

By combining gamification techniques with AI-driven adaptability, GenAI Interactive Learning Games seeks to make education more accessible, engaging, and effective. The project envisions a scalable and user-friendly solution that empowers learners through fun, challenge-based activities while leveraging AI for continuous improvement. This initiative aims to set a new standard for interactive digital learning in multilingual environments.

4.Introduction

Innovative Learning: AI integration transforms traditional methods into interactive, personalized, and gamified educational experiences.

Dynamic Content Creation: Generative AI creates real-time quizzes, puzzles, simulations, and scenarios tailored to individual progress.

Personalized Learning Paths: The app adapts difficulty and content based on user performance, providing customized exercises.

Gamification Elements: Incorporates points, levels, rewards, and time-limited challenges to boost engagement and motivation.

Multisensory Interaction: Supports learning through text,visuals,enhancing the overall educational experience.

Flexible Timing: Offers self-paced learning and session-based options (short, medium, or extended) to suit different schedules.

Progressive Difficulty Levels:

Beginner & Novice: Simple exercises, quizzes, puzzles, and guided AI support.

Intermediate: Complex problem-solving tasks and scenario-based learning.

Advanced & Expert: High-level simulations, real-world challenges, and competitive multiplayer modes.

Enhanced Outcomes: Improves knowledge retention, critical thinking, and overall learning through adaptive and engaging challenges.

Global Accessibility: Scalable design makes adaptive learning accessible to diverse learners worldwide.

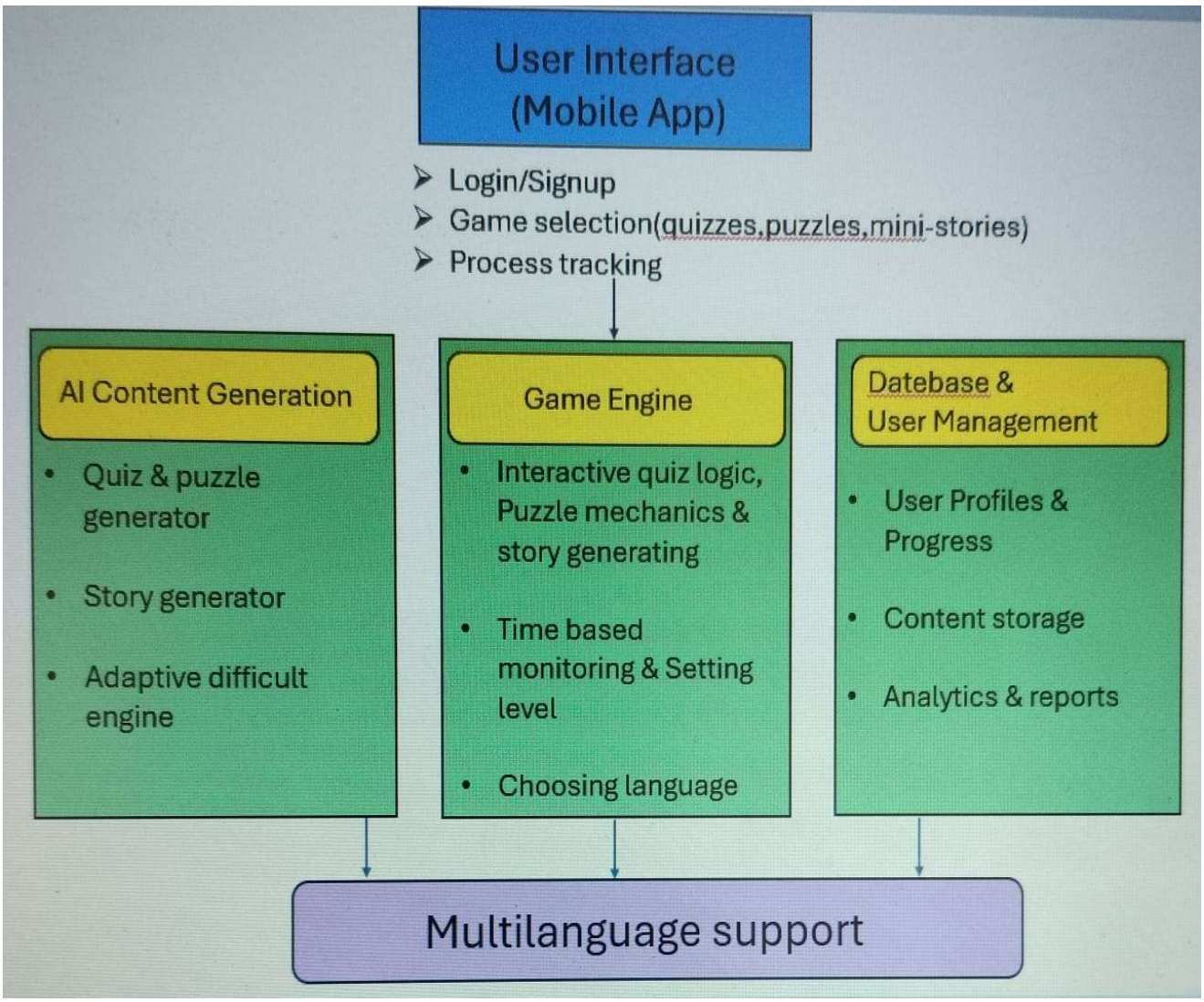
Future Exploration: The report will delve into the technological framework, user impact, and the app's role in modern education.

5.System Architecture:

The system consists of:

- Language & Translation: Flask
- Generating Questions: GPT, BERT
- Frontend: Web Interface
- Backend: Typescript
- AI Modules
- Recommendation engine (collaborative Filtering)

6.Flow of the project:



7.Detailed Explanation

The block diagram illustrates the architecture of GenAI Interactive Learning Games, showcasing how different components interact to provide an AI-powered, multilingual educational experience.

7.1. User Interface (Mobile App)

This is the front-end that users interact with. It consists of:

Login/Signup – Allows users to create accounts, sign in, and track progress.

Game Selection – Users can choose between different game modes such as quizzes, puzzles, mini-stories as games.

Progress Tracking – Displays learning progress, achievements, and performance analytics.

7.2. AI Content Generation

This is the core intelligence behind the app, responsible for dynamically generating educational content. It includes:

Quiz & Puzzle Generator – AI creates quizzes and puzzles based on difficulty level and user preference.

Story Generator – AI generates mini-stories tailored to language learning and cognitive development.

Adaptive Difficulty Engine – The AI adjusts game difficulty in real-time based on user performance.

7.3. Game Engine

This component processes user inputs and ensures smooth gameplay. It handles:

Interactive Quiz Logic – Manages question-answer interactions and scoring mechanisms.

Puzzle Mechanics – Controls puzzle-solving logic, hints, and solutions.

7.4. Database & User Management

This is the backend that stores and manages all user-related data. It includes:

User Profiles & Progress – Stores user login details, learning history, and preferences.

Content Storage – Saves AI-generated quizzes, puzzles, and stories.

Analytics & Reports – Tracks user performance and provides insights for improvement.

7.5. Multilingual Support

The app supports learning in multiple languages to enhance accessibility.

The multilingual component ensures that AI-generated content is translated and adapted for different linguistic and cultural contexts.

8.Overview of Generative AI in Learning Games

8.1.What is Generative AI?

A branch of AI that creates new content like text, images, quizzes, and stories.

Uses models like GPT to generate human-like, dynamic educational content.

8.2.Role of AI in Educational Games:

Creates adaptive questions, puzzles, and stories based on learner progress.

Provides real-time feedback and personalized learning paths.

Enhances interactivity through smart characters and scenarios.

9.Technical Aspects:

The Generative AI Interactive Learning Games were developed as a responsive website, enabling seamless access across desktops, tablets, and smartphones without the need for installation. The website was built using no-code/low-code platforms such as replit which offer visual design tools and flexibility for adding custom interactive elements. These platforms allow for quick prototyping and easy integration with third-party services, making them ideal for educational applications.

For content generation, Generative AI models like OpenAI's GPT-4 were integrated using secure API connections. These models are responsible for creating dynamic quizzes, puzzles, mini-stories, and multi-language-based activities making the learning experience

multilingual and adaptive. The AI adjusts difficulty levels based on user performance, offering a personalized learning path for each user.

To manage content and user data, cloud databases such as Google Sheets are used. These databases handle user accounts, progress tracking, and game content dynamically. Security is a key priority, with measures such as end-to-end encryption, OAuth-based user authentication, and data access control ensuring that learner information is kept private and protected.

Additionally, the website is designed with scalability and accessibility in mind. Features like offline content previews, screen reader compatibility, and touch-friendly UI elements make the platform inclusive for diverse users. The modular structure also allows for future expansion—such as integrating AI voice assistants, progress analytics dashboards, or AR/VR elements—making the system future-ready and adaptable to evolving educational needs.

10.Glimpse of the Project:

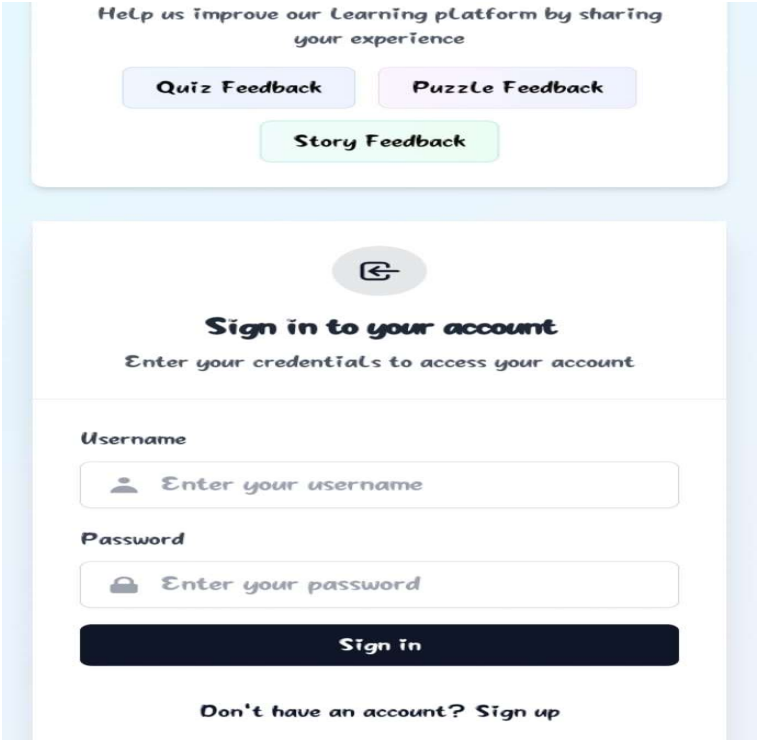


Fig 10.1: frontend - login

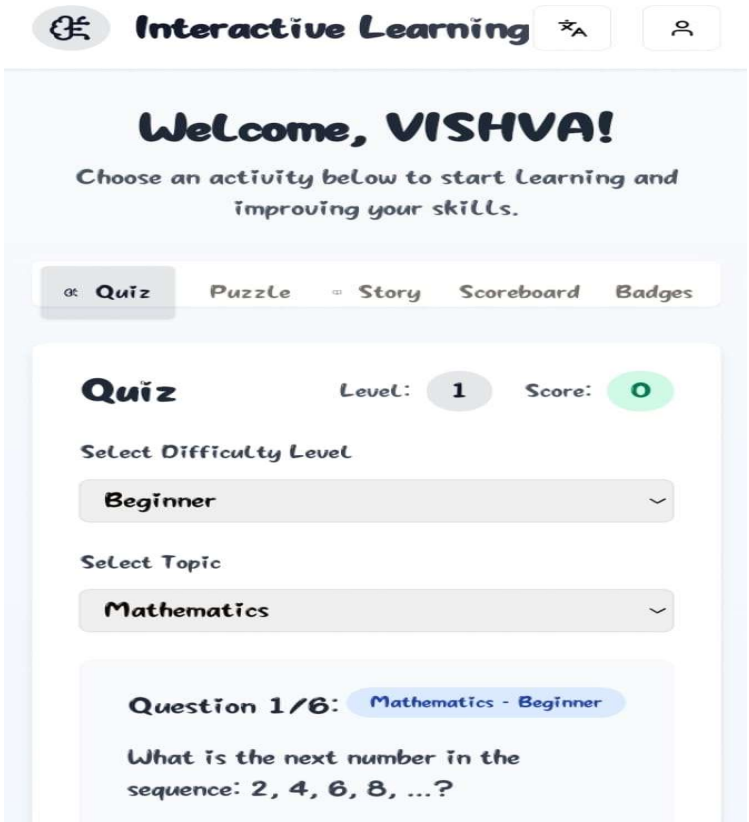


Fig 10.2: screen for quiz

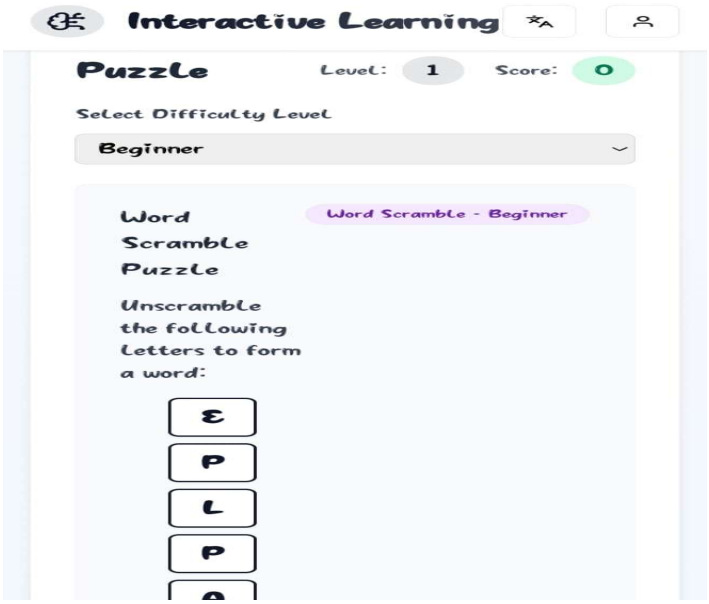


Fig 10.3: screen for puzzle

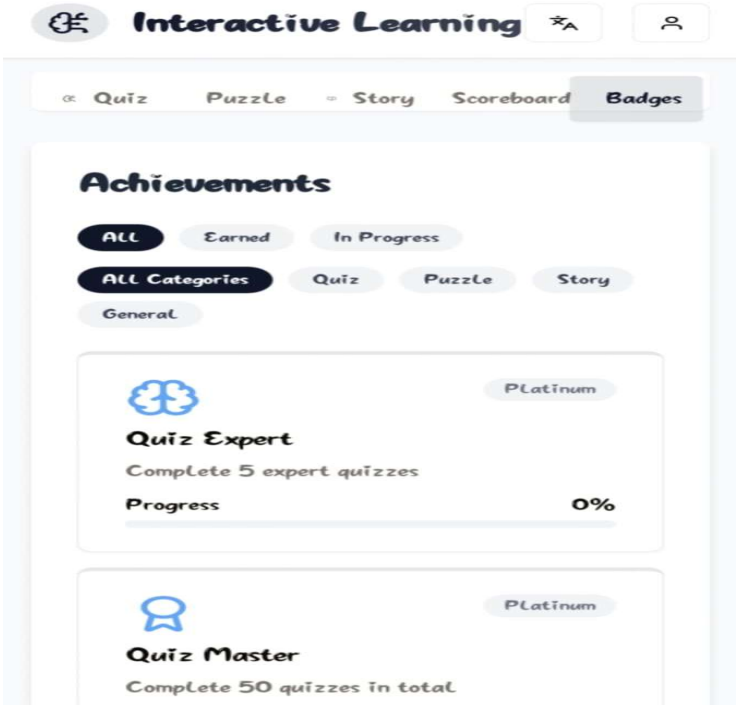


Fig 10.4: Dashboard

11.Benefits of GenAI Interactive learning games:

1. Personalized Learning – AI adapts content to individual skill levels and preferences.

2. Highly Engaging – Gamification and AI-driven challenges keep learning fun.

3. Instant Feedback – Provides real-time assessments and personalized tips.

4. Scalable & Accessible – Supports multiple languages and 24/7 learning.

12.Future Scopes

- AI will provide deeper personalization, adapting to emotions, learning styles, and cognitive abilities.
- Integration with AR/VR will create immersive, hands-on learning experiences.
- AI will generate text, audio, video, and interactive content for multimodal learning.
- Multiplayer AI-powered games will enable real-time collaboration and peer learning.
- AI-driven virtual mentors will offer personalized guidance and study plans.
- More languages and culturally relevant content will enhance accessibility.

13.Conclusion

Generative AI Interactive Learning Games have the potential to revolutionize education by making learning more personalized, engaging, and accessible. With AI-driven customization, real-time feedback, and multilingual support, these games cater to diverse learners and enhance skill development. The integration of emerging technologies like AR/VR and AI tutors will further improve learning outcomes. While challenges like content accuracy and ethical AI need to be addressed, the future of AI-powered education is promising. This project paves the way for scalable, innovative, and interactive learning experiences for all.