

CASE STUDY REPORT OF LEARNING GAME APP



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Project Report: Learning Games App

1. Executive Summary

The **Learning Games App** is a highly engaging and interactive educational mobile application tailored for adult learners preparing for standardized exams such as GRE, IELTS, and other professional qualification exams. The application integrates **gamification**, **adaptive learning**, and **dynamic problem generation** for an enhanced learning experience. This project aims to create a unique platform where users can study through an enjoyable yet efficient mechanism, utilizing features like progress tracking, personalized learning paths, and a wide array of educational resources.



The Learning Games App will focus on making the process of exam preparation for adults more efficient, engaging, and comprehensive. By incorporating features such as real-time feedback, mock exams, dynamic content generation, and gamified elements, the app seeks to bridge the gap between traditional study methods and modern, technology-driven educational tools.

2. Project Objectives

The primary objectives of the Learning Games App are:

1. Engaging Learning Experience:



• To develop an app that offers learning resources for standardized exams like GRE, IELTS, and others while making the process enjoyable through game-like elements.

2. Adaptive Learning:

• Incorporate adaptive learning pathways that adjust content difficulty based on user performance, ensuring personalized learning experiences.

3. Dynamic Problem Generation:

• Implement a system for generating GRE-style math problems dynamically. This ensures users never encounter the same question twice, enhancing practice and mastery.

4. Gamification for Motivation:

• Integrate gamified elements such as badges, rewards, challenges, and leaderboards to increase user engagement and drive continued use of the app.

5. Feedback and Progress Tracking:

• Provide detailed feedback on users' progress, helping them identify strengths and weaknesses to improve their exam performance.

3. App Features

1. Adaptive Learning Pathways:

• The app will track users' progress, adjusting task difficulty in real-time based on their performance. For example, if a user struggles with math problems, the app will present easier, foundational problems to build confidence before advancing to more complex challenges.

2. Math Problem Generation:

- **Problem Types**: Algebra, Geometry, Probability, and Data Interpretation problems tailored to the GRE.
- **Dynamic Problem Generation**: The app utilizes **external APIs** (Mathway, Wolfram Alpha) and **custom libraries** (SymPy) to generate a large variety of dynamic problems, offering users different challenges with each attempt.

3. Gamification:

- Users will receive **badges** and **rewards** for completing tasks, challenges, and quizzes. **Leaderboards** allow users to compete with others, fostering motivation and a sense of accomplishment.
- Example: "Complete 50 algebra problems to earn a Silver Badge" or "Solve 100 GRE math problems to rank on the leaderboard."

4. Mock Tests:

• The app will offer full-length **GRE** and **IELTS** mock exams, allowing users to experience the exam environment with **real-time scoring** and **instant feedback**. These mock tests will simulate actual exam conditions, giving users a better understanding of time management and test format.

5. Interactive Learning Materials:

• The app will feature **video tutorials**, **step-by-step guides**, and detailed solutions for complex problems, particularly in math topics. This feature aims



to explain concepts that users might find difficult, helping them understand key areas of the exam content.

4. GRE Apps (App Design and Structure)

The **GRE Apps** document focuses on the **UI/UX design** and **content creation** specifically for GRE preparation. It highlights essential features to create an intuitive and effective learning platform for GRE users.

- 1. Core Screens:
 - The app includes essential screens for a smooth user journey, such as:
 - Login/Onboarding: Easy entry and personalized account setup.
 - Home Dashboard: A central hub displaying progress, achievements, and study goals.
 - **Study Modules**: Organized sections for **Verbal**, **Quantitative**, and **AWA** (Analytical Writing Assessment) preparation.
 - **Results/Analytics**: A progress tracker that shows performance trends and areas for improvement.

2. Content Creation:

- The app includes comprehensive educational content, such as:
 - **Vocabulary Flashcards**: Over **500 words** with definitions, example sentences, and practice sets to build verbal skills.
 - **Practice Questions**: Diverse question sets across verbal reasoning, quantitative reasoning, and the Analytical Writing section. Each question is designed to mirror the structure of actual GRE exam questions.

3. App Structure:

- The app is designed with a **smooth navigation flow** to guide users from onboarding to study modules:
 - Splash Screen \rightarrow Login/Signup \rightarrow Home Dashboard \rightarrow Study Modules \rightarrow Results.
 - The bottom navigation bar allows easy access to all major areas like learning, tests, profile, and settings.

4. **Progress Tracking**:

- The app tracks the user's progress, showing detailed feedback, streaks, and performance graphs:
 - Users can view their overall progress, test results, and historical performance.
 - The app encourages consistent study habits by tracking **streaks** (e.g., "You studied 6 days in a row!") and setting study goals.



5. Technical Architecture

1. Frontend Development:

- **React Native** or **Flutter** will be used for cross-platform mobile app support, ensuring compatibility across both **iOS** and **Android** devices.
- **React.js** will be used for the web interface to provide a responsive desktop version of the app.

2. Backend Development:

- **AWS** or **Google Cloud** will be employed for scalable storage and hosting, ensuring that the app can handle a large user base and store substantial amounts of data, such as user profiles, test results, and progress tracking.
- A **relational database** (PostgreSQL) will store user data and learning progress, ensuring that all user-specific information is properly organized.

3. API Integrations for Math Problem Generation:

- **Mathway API**: Allows the app to solve algebraic, geometric, and calculus problems dynamically.
- **Wolfram Alpha API**: Used for advanced mathematical problem-solving and providing step-by-step solutions, especially for data interpretation and advanced topics.
- **SymPy (Python Library)**: A Python-based library used for generating problems in algebra and calculus dynamically.

4. Speech Recognition for IELTS Speaking:

• Integration with **Google Speech-to-Text** or **IBM Watson** allows users to practice for the speaking component of the IELTS exam. These tools provide feedback on pronunciation, fluency, and grammatical accuracy.

6. Math Problem Generation

- 1. Math Content Sources:
 - **SymPy**: A Python library for generating dynamic algebra and calculus problems.
 - Mathway API: Provides step-by-step solutions for real-time problem-solving.
 - **Wolfram Alpha**: Offers advanced solutions for GRE math problems, including graphical representations.
- 2. Pre-made Math Problems Database:
 - Resources like **Brilliant.org** and **AoPS** provide advanced problem sets, which can be adapted for higher-level GRE preparation.
- 3. Custom Math Problem Generation:

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• Libraries such as **NumPy** and **Matplotlib** will be used to generate dynamic data interpretation questions and graphs, providing users with varied and challenging problems.

7. Integration of Math Content

- 1. Problem Types:
 - Algebra: Solving equations, inequalities, and graphing functions.
 - **Geometry**: Area, perimeter, and volume calculations.
 - **Probability**: Combinatorics, probability distributions, and permutations.
 - **Data Interpretation**: Analyzing graphs, tables, and charts.

2. Math Problem Flow:

- Users select a topic or allow the app to recommend problems based on their previous learning progress.
- Dynamic problem generation ensures that each user receives unique questions each time they practice.
- After completing a problem, the app provides **immediate feedback** and **stepby-step solutions** to help users understand their mistakes and learn from them.

8. User Experience & Interface Design

1. User Flow:

- **Onboarding**: Introduces the user to the app's features, guiding them through setting up their study preferences.
- **Dashboard**: Displays the user's learning progress, achievements, and upcoming challenges. Users can also view detailed analytics regarding their performance.
- **Math Problem Interface**: A simple, clean design featuring multiple-choice questions with a hint system and buttons for displaying solutions.
- **Leaderboard and Achievements**: A gamified leaderboard system to compare performance with peers, fostering competition and a sense of accomplishment.
- **Voice Feedback for IELTS Speaking**: Users can practice their speaking skills and receive feedback on their pronunciation and fluency.

2. UI/UX Design:

- **Color Scheme**: The app will use light, engaging colors (pastel shades) that make the learning environment comfortable without causing distractions.
- **Fonts**: Clear, easy-to-read fonts will be used for both mobile and desktop platforms.



• **Interactive Elements**: Elements like drag-and-drop features will be implemented to make math problems more interactive.



9. Monetization Strategy

1. Freemium Model:

- **Free Access**: Basic features, such as limited quizzes and basic problem generation, will be available for free.
- **Premium Version**: Paid access to full mock exams, advanced problem-solving tools, and detailed progress reports.

2. Subscription Model:

• Users can choose a **monthly or annual subscription** for full access to all features, including premium content, detailed analytics, and additional learning paths.

3. In-App Purchases:

• Additional content, such as **premium GRE mock exams**, **video tutorials**, and **personalized coaching**, will be available for purchase.

4. Ad Revenue:

• **Display Ads** will be shown to non-paying users. These will be non-intrusive and targeted at educational content to align with the app's mission.



10. Conclusion

The **Learning Games App** seeks to provide a comprehensive and engaging platform for adult learners preparing for exams like GRE and IELTS. With its dynamic problem generation, gamification, adaptive learning pathways, and integration with leading educational APIs, the app promises to revolutionize the way students prepare for important exams. By offering personalized feedback, real-time progress tracking, and an intuitive user interface, the app aims to improve user engagement and increase exam readiness.