



# PROJECT PROPOSAL

2025 WMDD Capstone







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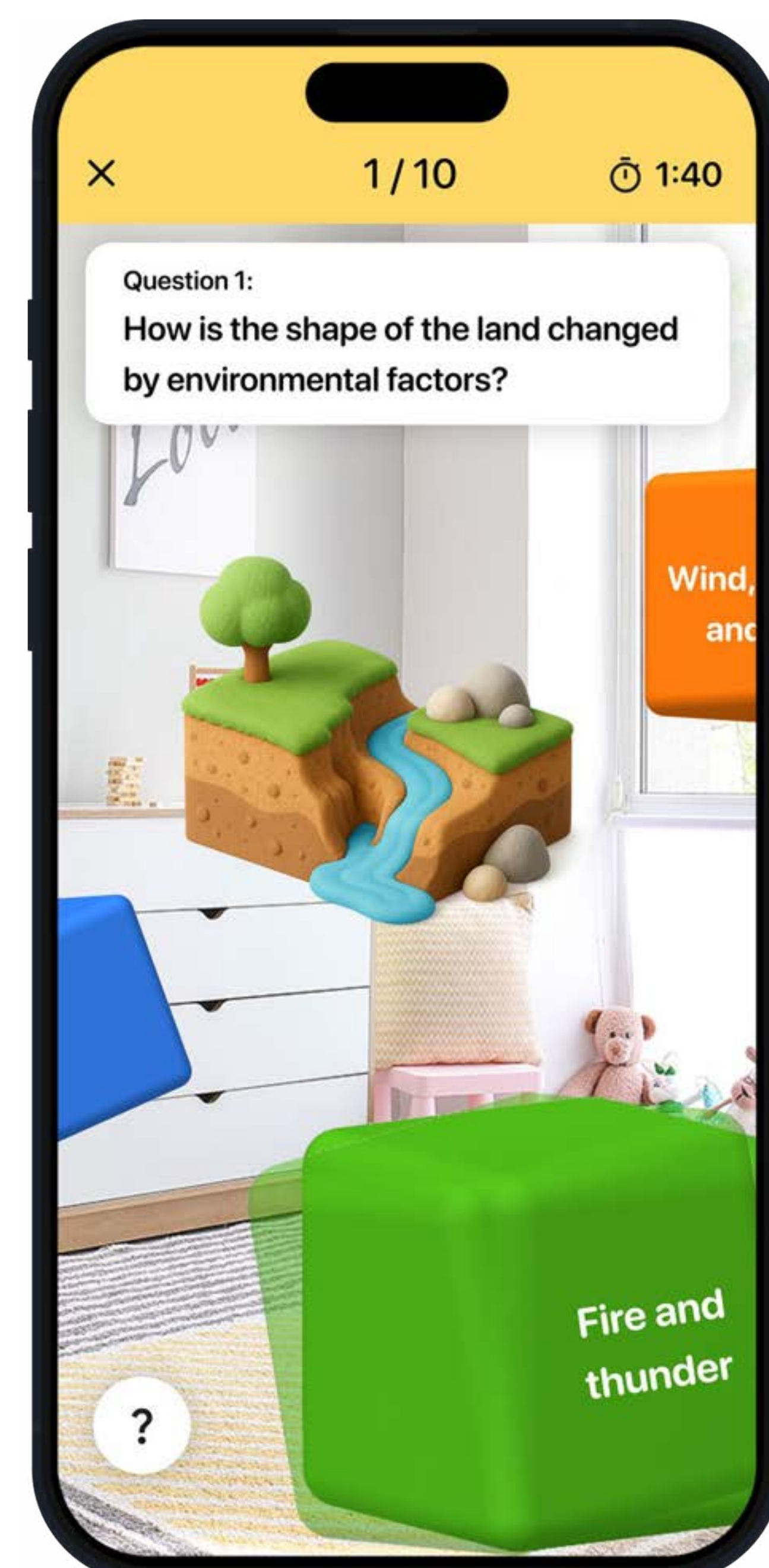
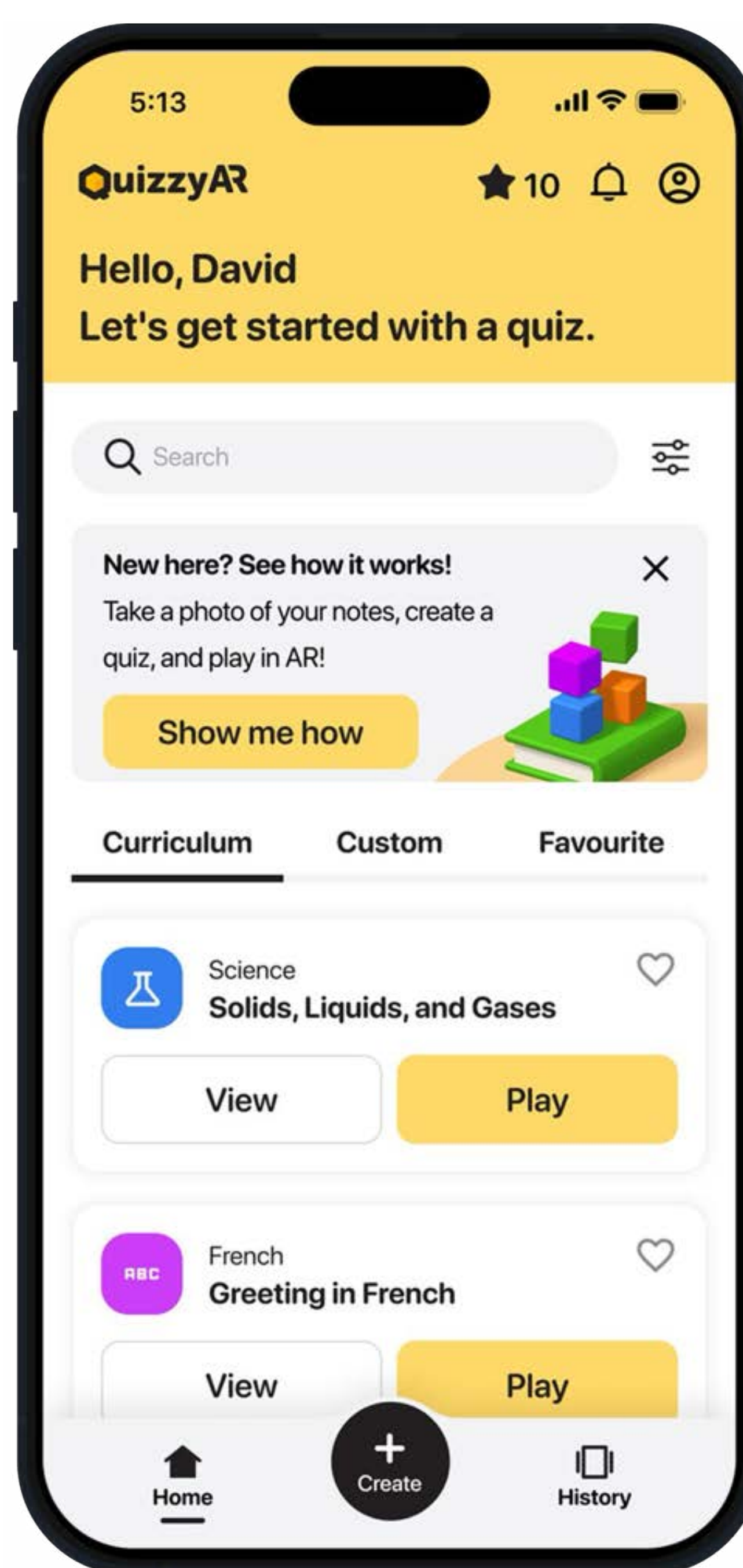
**Check Our Website**  
[quizzyar.wmdd.ca](http://quizzyar.wmdd.ca)



# Overview

## Learning is Fun with AR Quiz Games

QuizzyAR is a mobile app designed to support the after-class studies of elementary school students. It uses AI to generate quizzes from their study materials, such as textbooks, tests, and notebooks and lets students play them in an augmented reality AR space.





A young boy with short brown hair, wearing a red sweater, is looking down at a white smartphone he is holding with both hands. He has a slight smile on his face. In the background, another student is visible at a desk, and the setting appears to be a classroom. There are three large, semi-transparent geometric shapes overlaid on the image: a green cube on the left, a blue triangle on the right, and an orange trapezoid at the bottom left.

”

**Turn study time into play time.  
Anytime, Anywhere.**

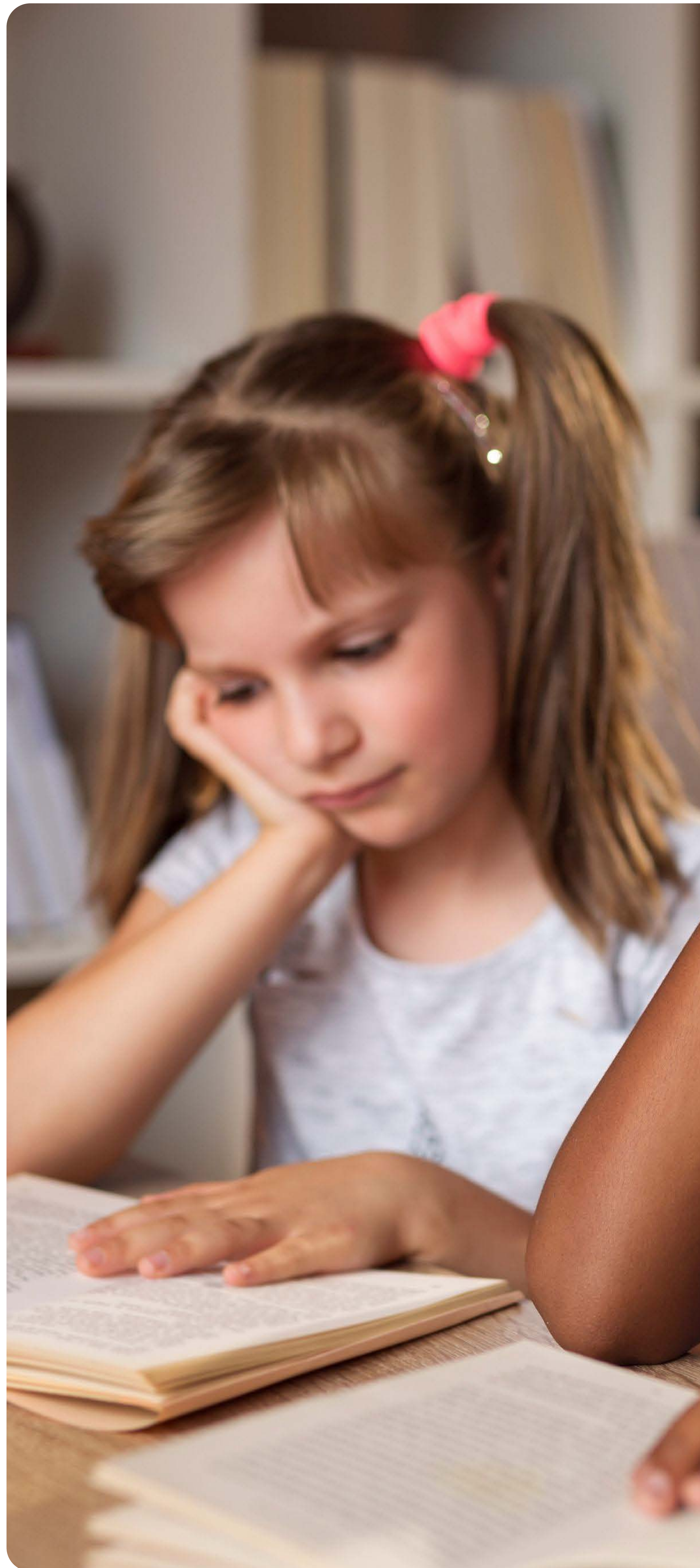
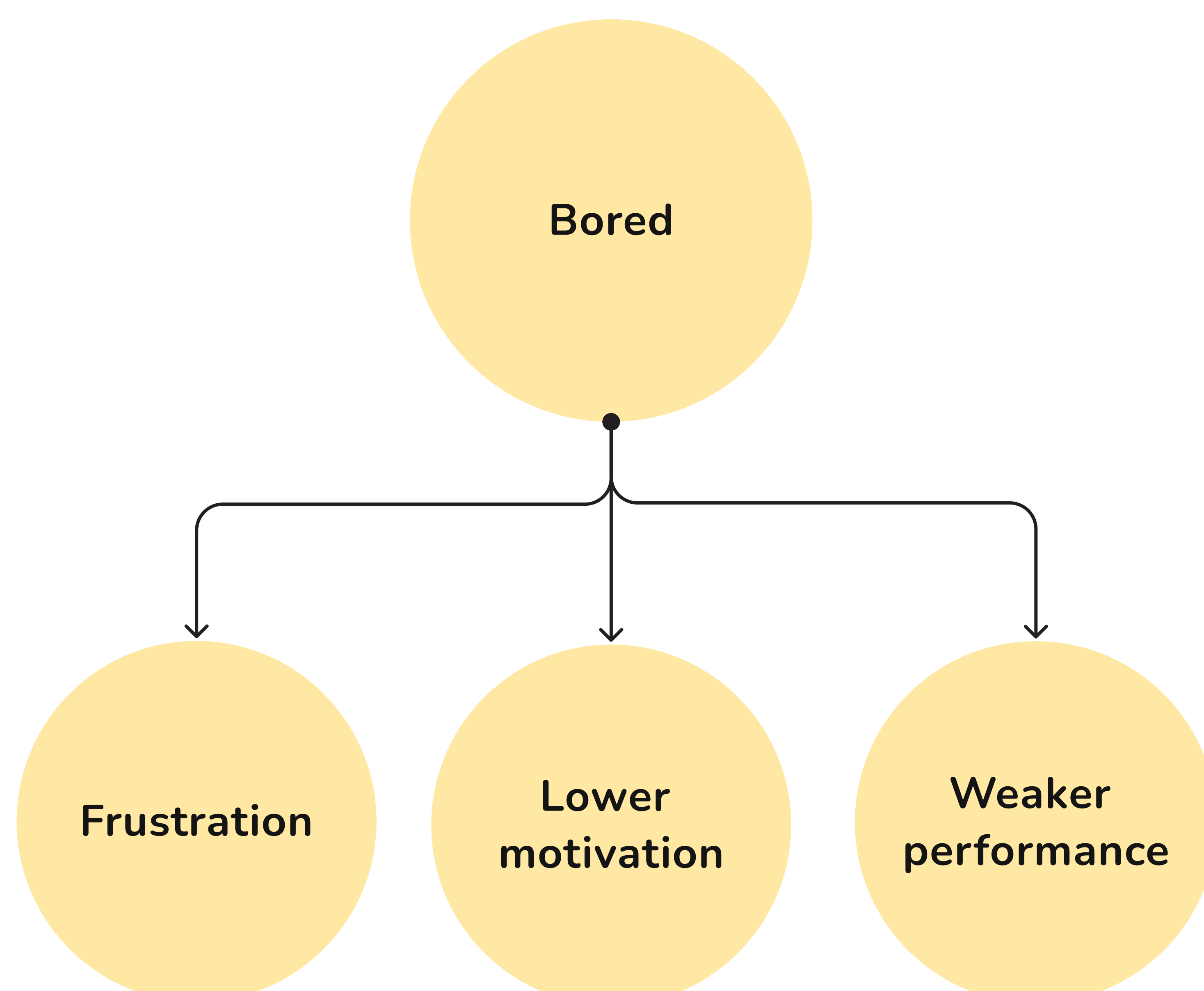


# Problems

**40%** of students report feeling bored while studying on their own

When students feel bored, they are less likely to stay focused, complete tasks, or enjoy the learning process. This boredom can lead to frustration, lower motivation, and weaker academic performance over time.

Studies from EdWeek and sources like GreaterGood highlight that boredom raises stress levels, reduces attention, and negatively affects learning outcomes. In other words, boredom not only makes students feel unmotivated, it also directly impairs their ability to learn and retain information.







# Solution

## How might we make after-school learning more fun and engaging for elementary students?

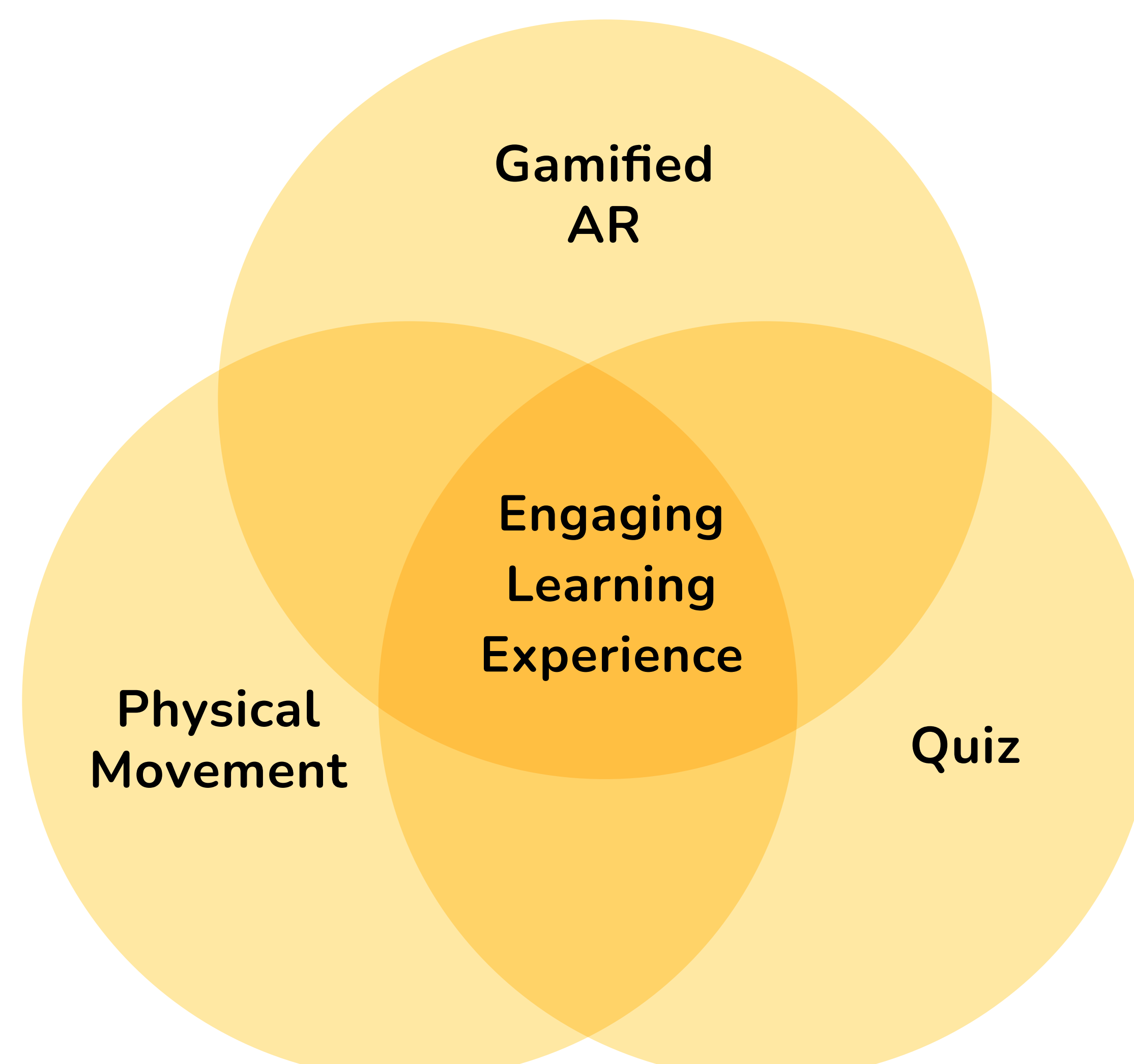
To address problems during after-school study, we integrated AI-powered quizzes, AR immersion, and physical movement. QuizzyAR not only makes learning more engaging but also more effective.

A study investigated the use of gamified learning in EFL (English as a Foreign Language) classrooms. The results showed that students found Quizizz, an online learning platform that offers gamified quizzes and interactive lessons, both interesting and enjoyable.

**Over 95% of the students agreed that it increased their motivation and made learning more fun.**

Augmented Reality (AR) has also shown strong potential in this area. **A meta-analysis of AR tools in education found that 100% of the reviewed studies reported positive effects on motivation, interest, or engagement.**





Moreover, studies on physical movement in learning show that moderate activity supports memory and focus. Children with ADHD **experienced a 51% improvement in working memory after engaging in physical activities.** This reinforces the value of combining movement with learning experiences.





# Competitive Analysis

To better understand current offerings in the market and identify opportunities, we looked into many competitors. Here we focus on three competitors.

	 QuizzzyAR	 Quizlet	 Quiz AI	 Wayground
AR Support	✓	✗	✗	✗
Game-Based Learning	✓	✗	✗	✓
AI Quiz Generation	✓	✓	✓	✓
Performance Review	✓	✓	✓	✓

## Quizlet

Quizlet provides a flashcard system and AI-powered study tools that help students learn and review. It is similar to traditional flashcard but applied game-based learning system.

URL : <https://quizlet.com/ca>

## Quiz AI

Quiz AI provides AI-generated quizzes, but it's mainly designed for teacher convenience with less emphasis on motivating or engaging younger students.

URL : <https://apps.apple.com/ca/app/quiz-ai-for-google-classroom/id6502432246>

## Wayground

Wayground delivers classroom quizzes and gamified elements. However, it lacks personalized content, which limits its effectiveness for learners after-class review.

URL : <https://wayground.com/?lng=en>

## QuizzzyAR

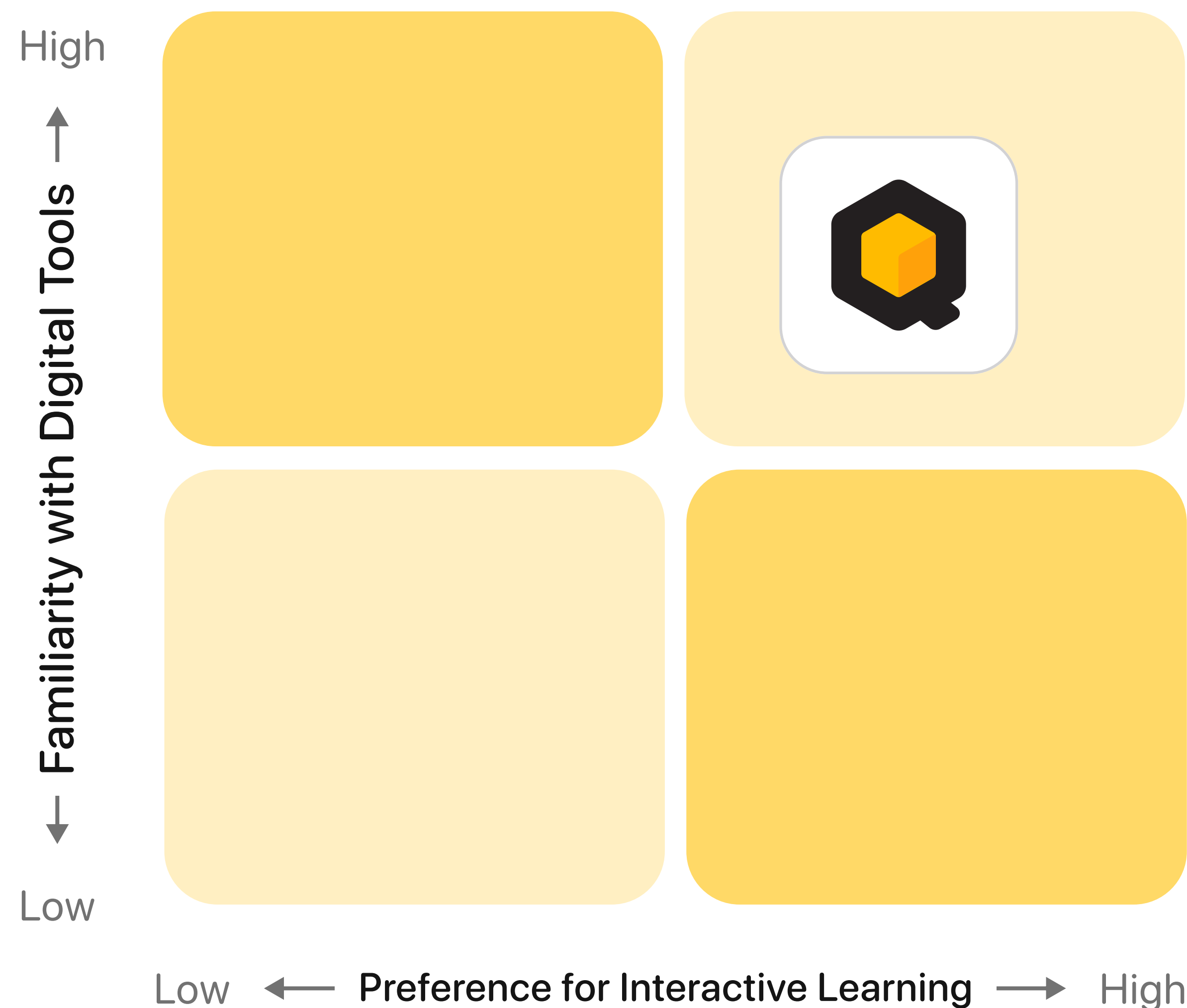
QuizzzyAR fills these gaps by combining AI-powered quiz generation with immersive AR gameplay tailored specifically for young learners' after-class review, transforming textbook, notes content into interactive experiences.



# Target Markets

## Children Segment

Familiarity with Tablets × Preference for Interactive Learning

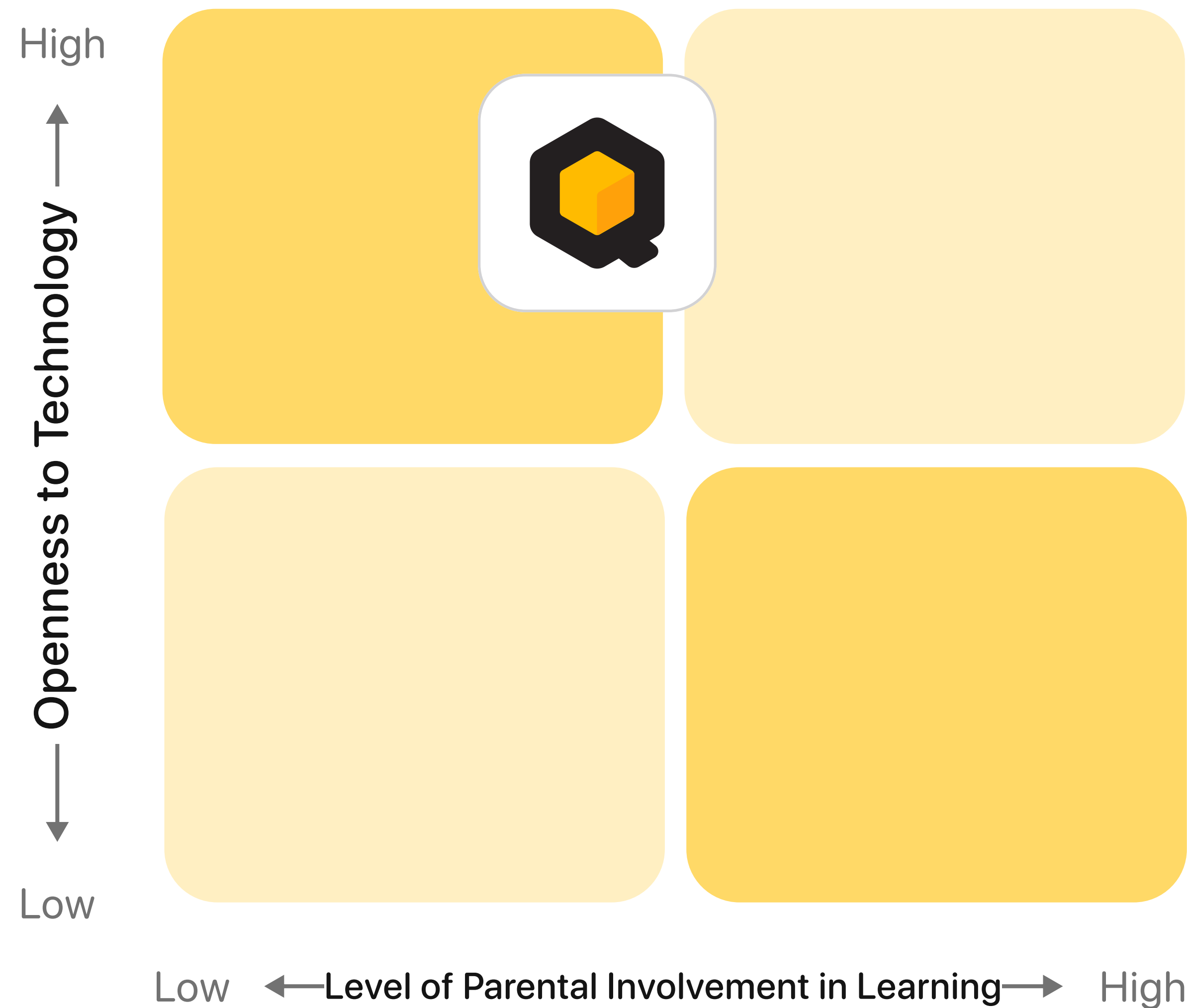


Our target users are **elementary kids aged 6–11 who are familiar with using digital tools** for both play and learning.

They're naturally curious, can be easily distracted by passive learning formats, and respond well to visual, interactive, and movement-based activities.

## Parent Segment

Tech Acceptance × Involvement Need



Our product targeted **tech-savvy parents aged 30–45** who are highly receptive to educational technology and want their kids to study independently using digital tools. These parents often live in urban areas, own devices like iPads. **They're busy, value purposeful screen time**, and are drawn to tools that can adapt to their child's actual lessons, so learning doesn't feel disconnected or random.



# Child Persona



## Thomas Mayer

Grade 4 Elementary Student

# 10 years old

# Living in Burnaby

# Public School

Thomas is a curious 10-year-old who learns best through visuals, games, and hands-on activities. He gets more excited when learning feels like play, but sometimes he loses focus with traditional worksheets.

### Challenges

- Gets bored easily with plain worksheets or silent reading
- Sometimes struggles to remember vocabulary after a lesson
- Has trouble focusing when the activity is too slow or repetitive
- Needs extra motivation to review material after class

### Goals

- To understand and remember what he's learning
- To enjoy learning through games and challenges

### Tech Access

- Uses a tablet at home, sometimes with help from a parent to get started



# Parent Persona



## James George

Parent - IT Manager

# 42 years old

# Living in Richmond

# Tech-savvy

James is an IT manager and a father of two children, aged 6 and 10. He works full-time, but spends time each evening helping his daughters with their homework. He is proactive about his children's education and enjoys integrating technology into their learning.

### Challenges

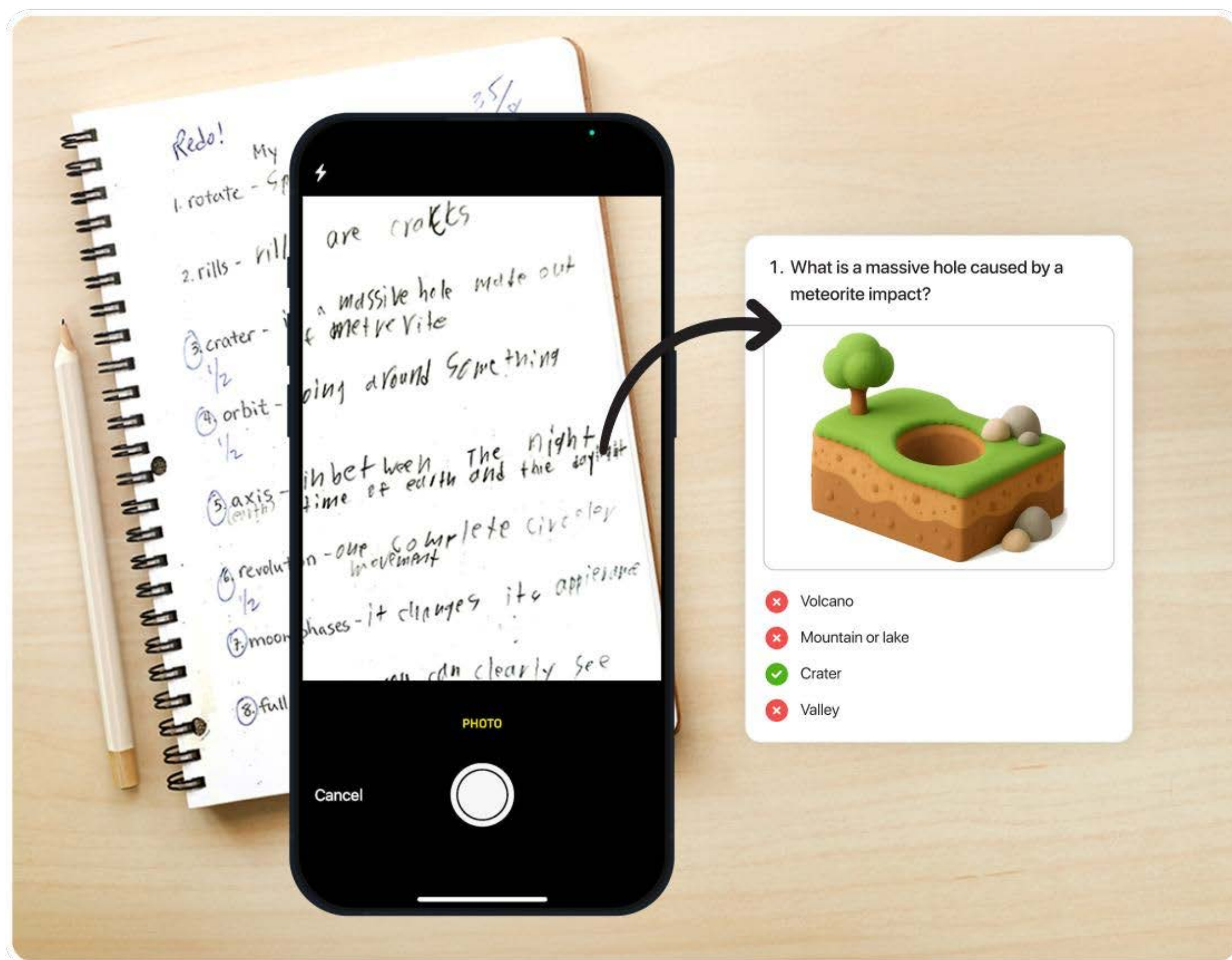
- Would like his children's screen time to be more balanced and focused on meaningful, educational activities
- Looks for tools that don't require constant adult supervision
- Feels overwhelmed by the number of EdTech tools available to choose from

### Goals

- Wants to review homework and lessons more effectively and enjoyably
- Uses technology to enhance learning
- Chooses content that fits each child's level with guidance or recommendations



# Main Features

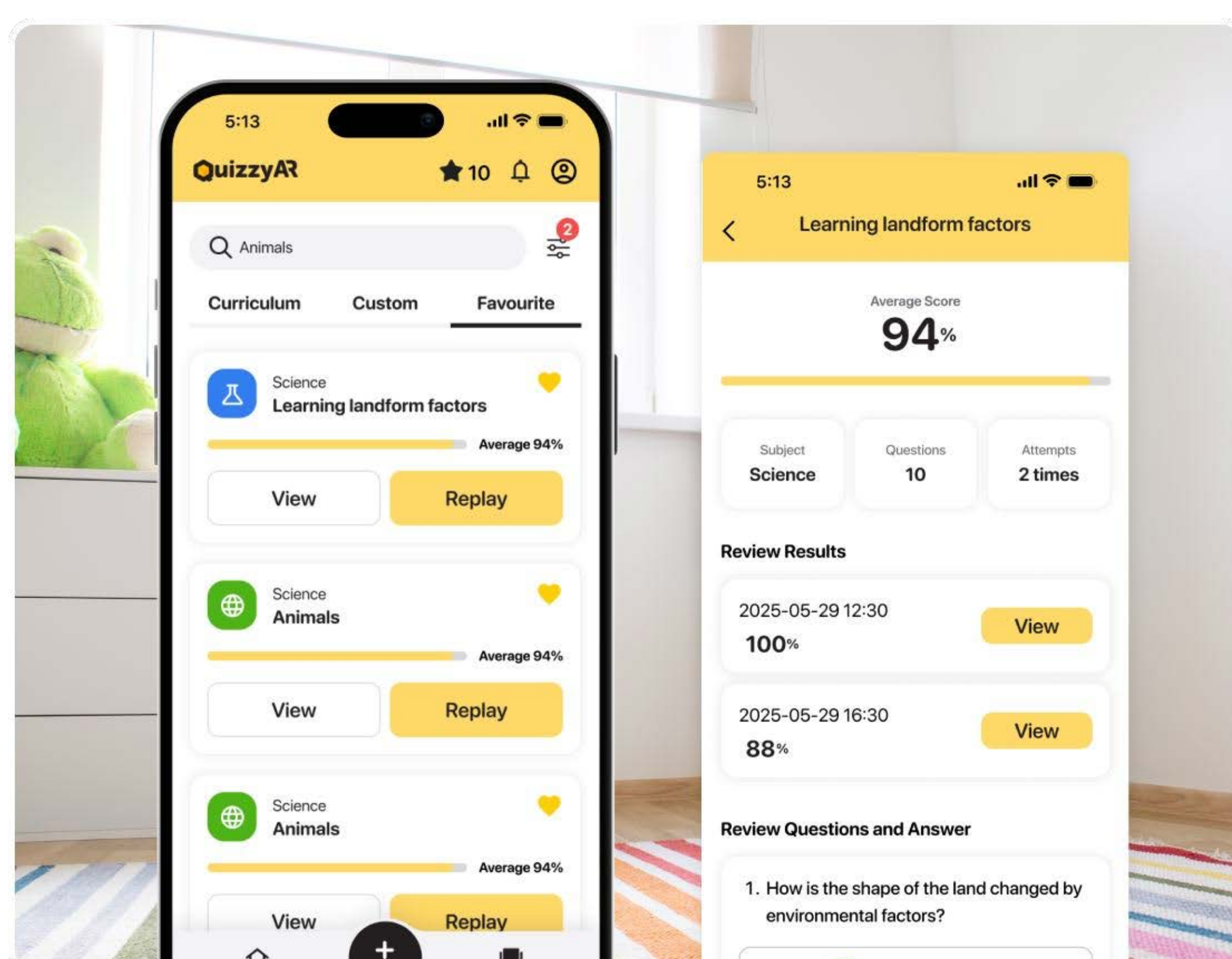
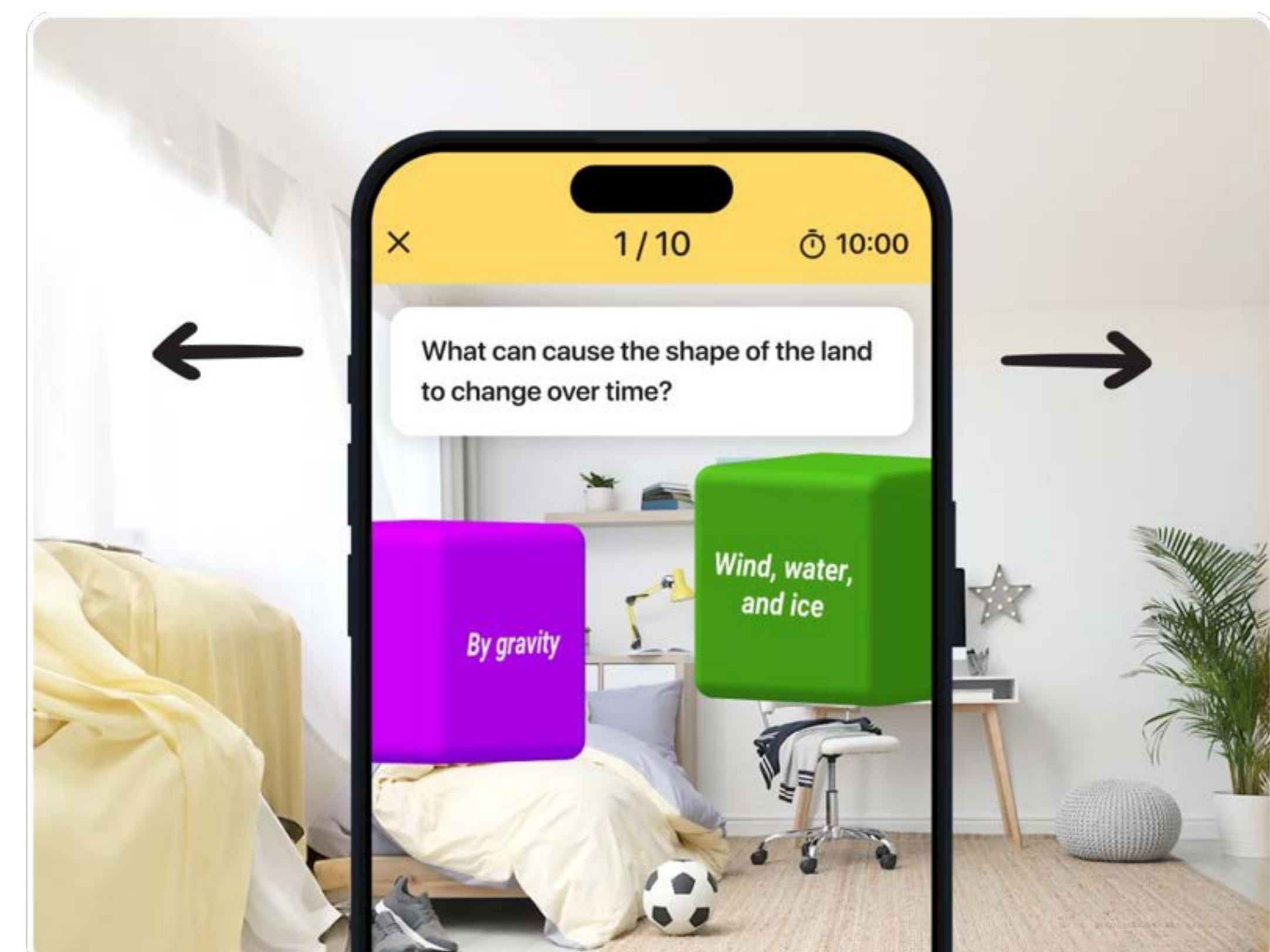


## AI-powered Quiz Creation

Users can upload a photo of a textbook page, class notes, or learning materials. The app uses AI to recognize the content and generate multiple-choice questions and related images. This feature helps students to memorize key concepts in subjects like Science, Math, Languages and Social Studies.

## AR Quiz Playroom

Each answer appears as a 3D floating box in the real-world environment. The user walks around to find the correct answer and taps it to respond. This adds fun, movement, and engagement to the learning process, making it more memorable.

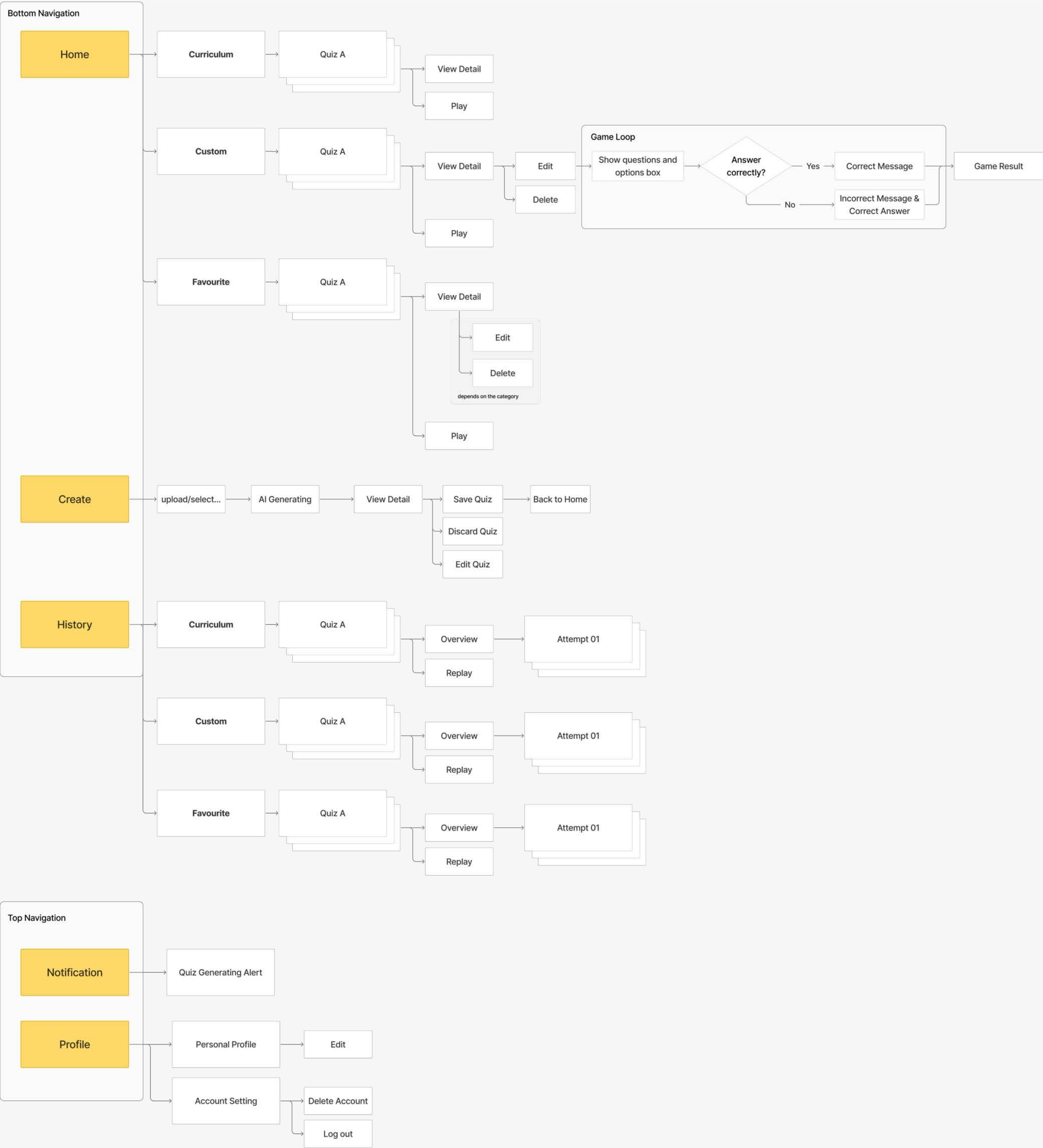


## Learning History

The app stores all previously completed quizzes and scores. This allows students or parents to review past questions, monitor progress over time, and better understand areas that need improvement.

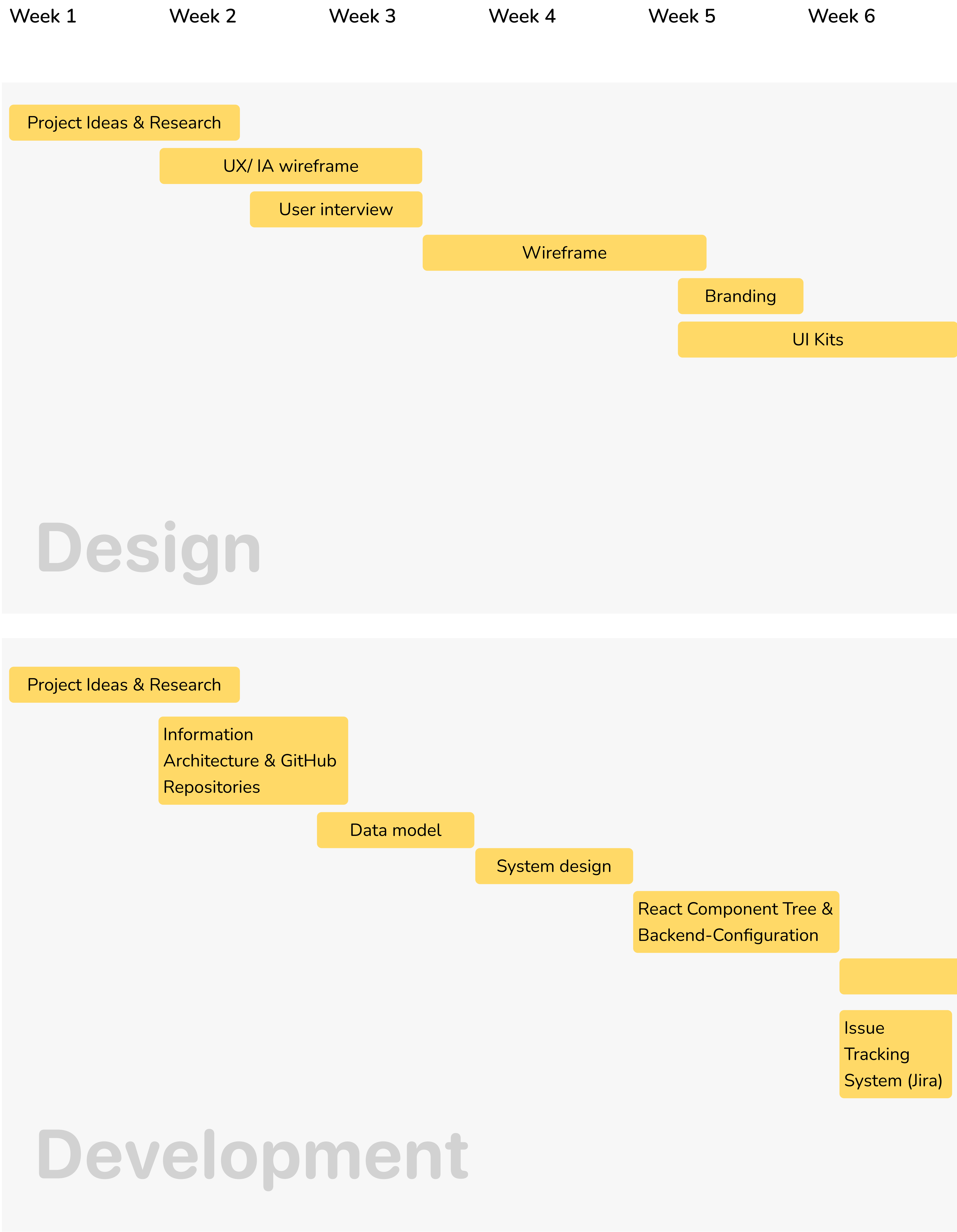


# User Flow



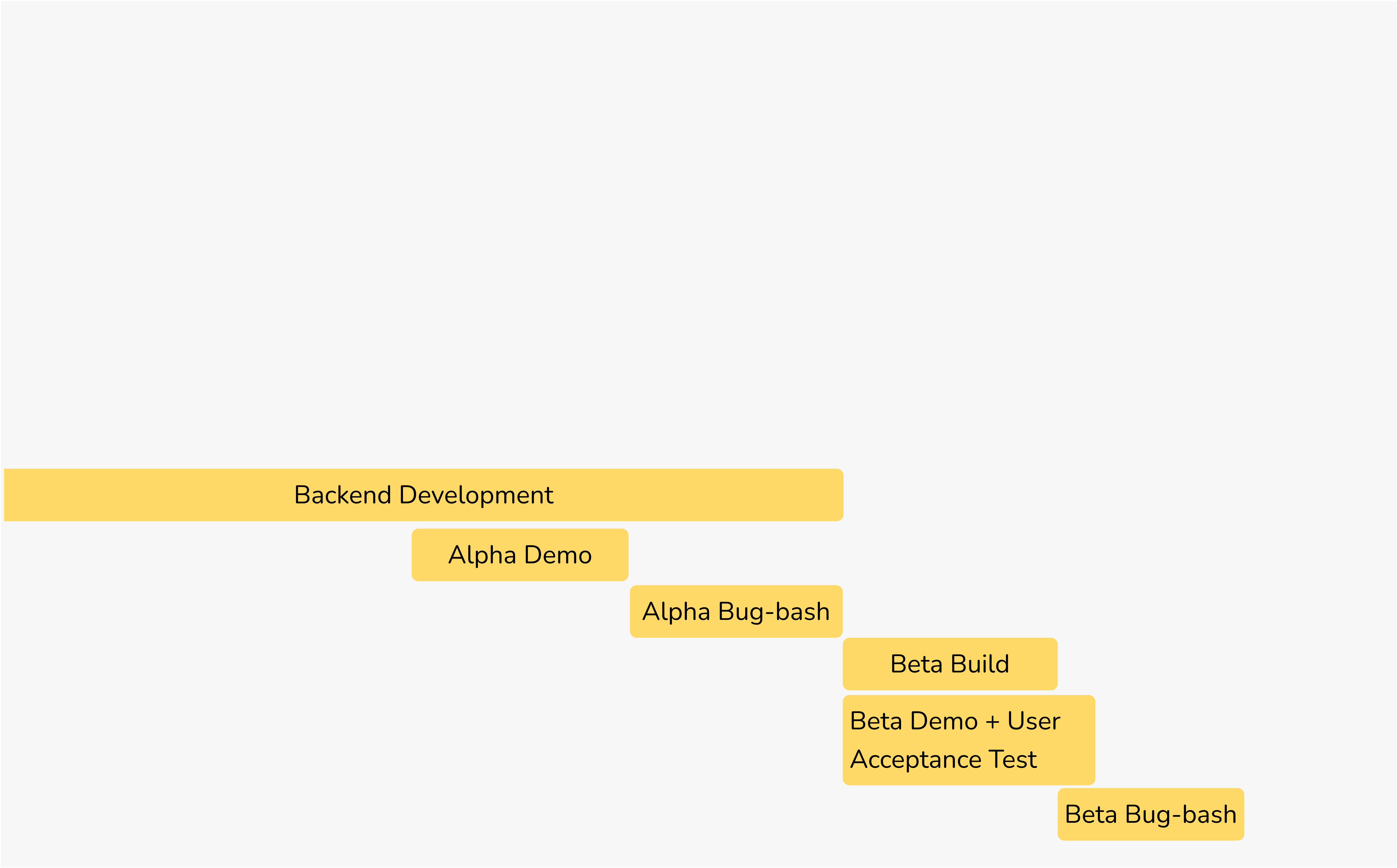
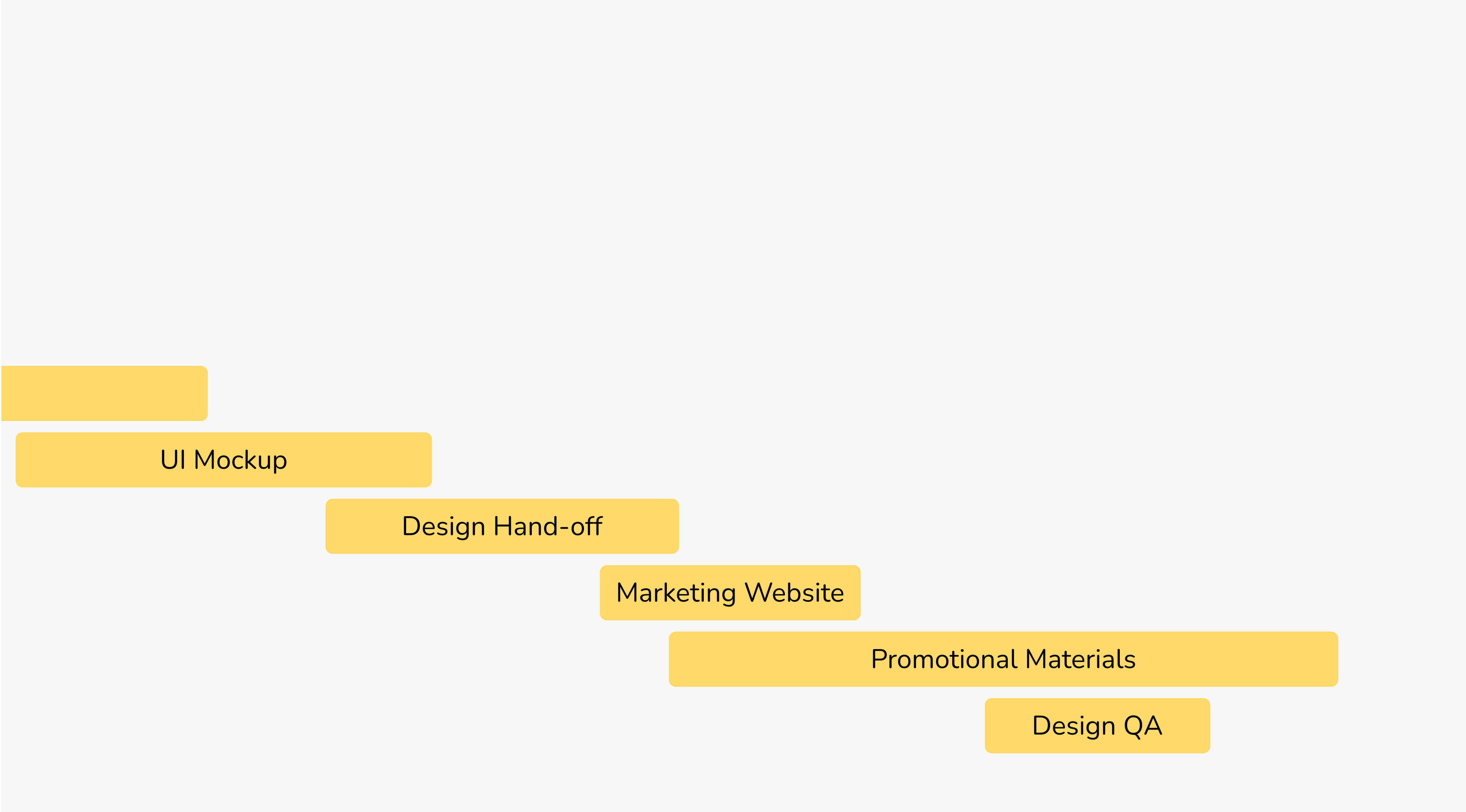


# Milestones





Week 7                      Week 8                      Week 9                      Week 10                      Week 11                      Week 12                      Week 13



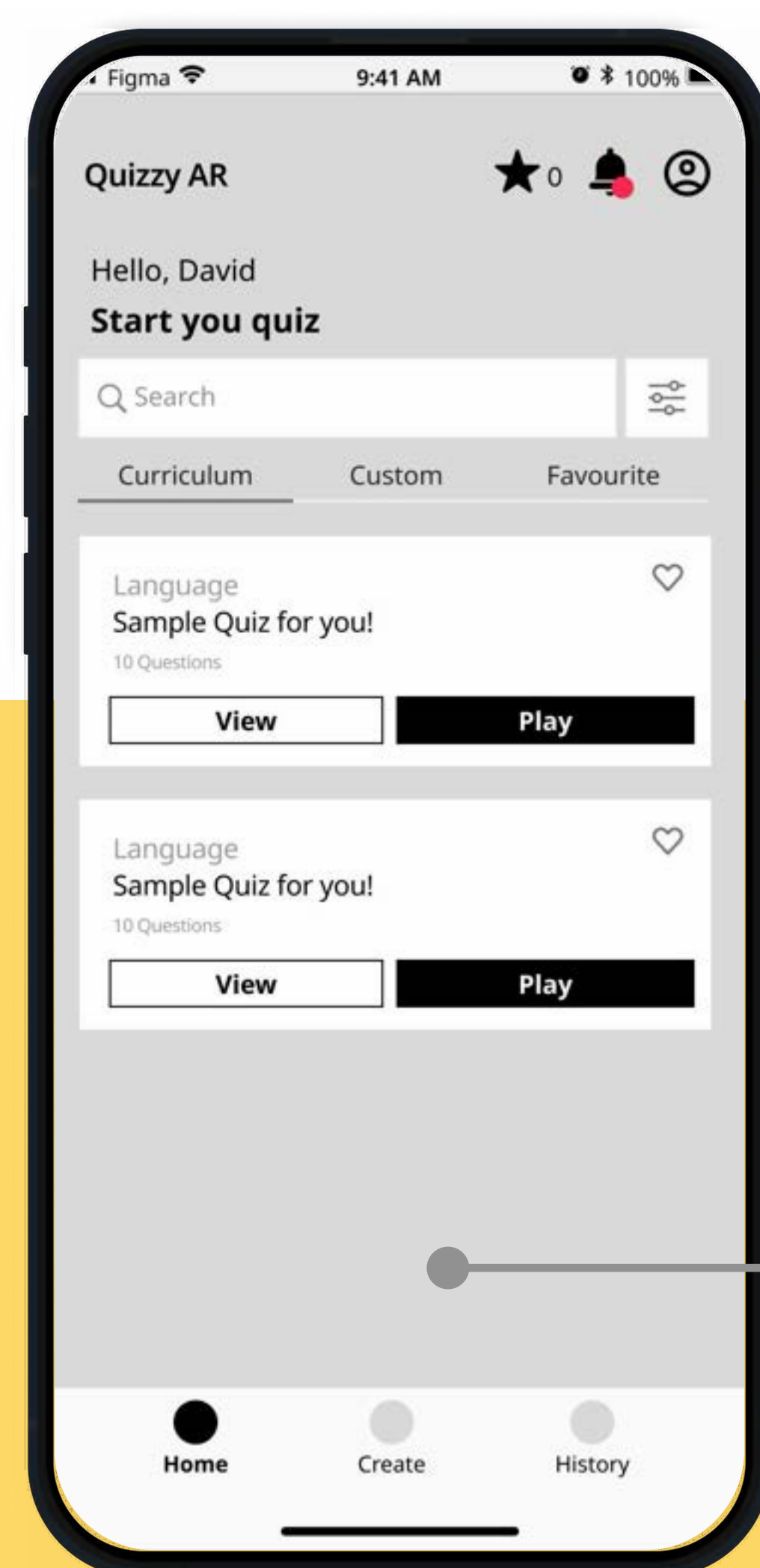


# Wireframes

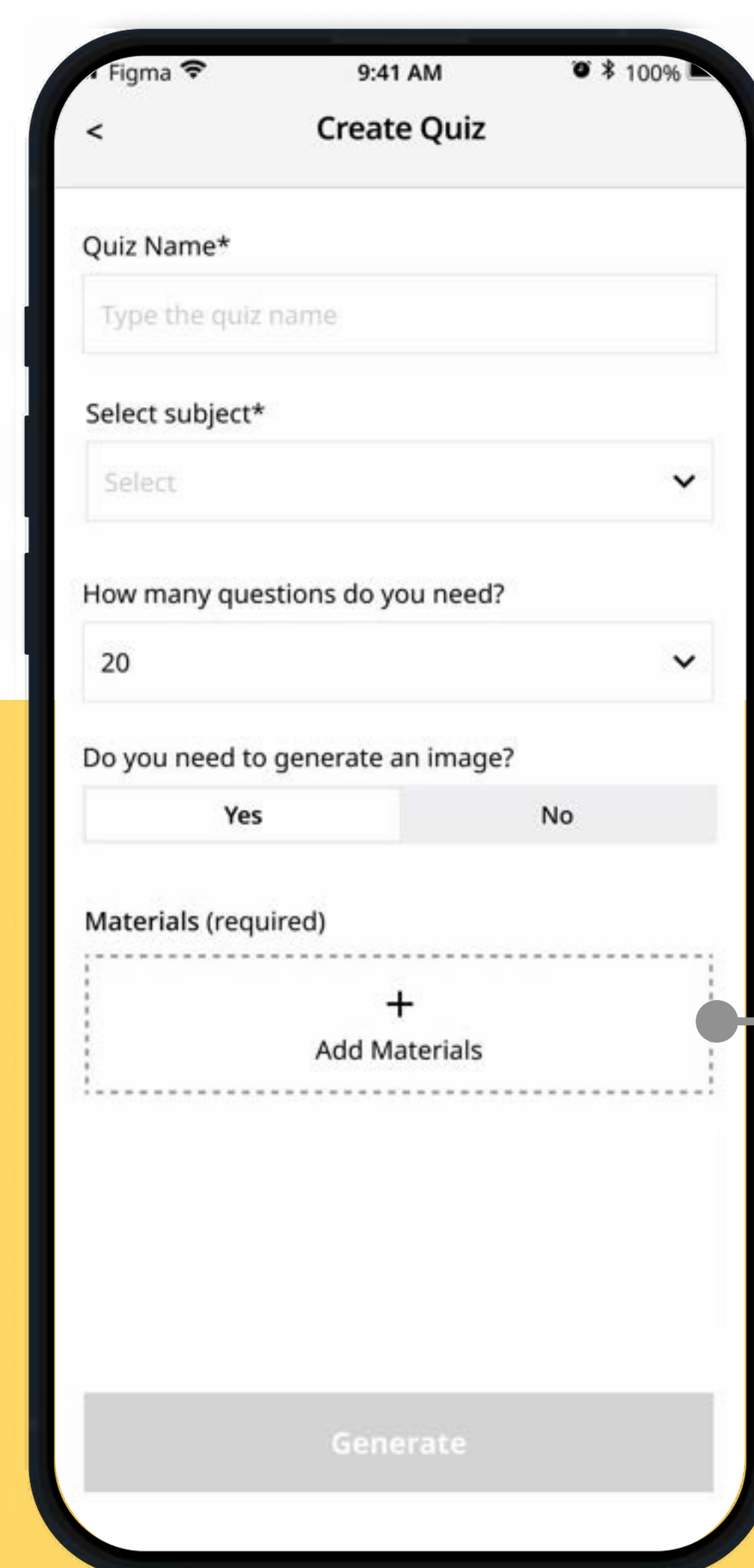
## Create Quiz using AI

Users can generate custom quizzes that match the actual content by uploading notes and textbook pages. This helps students study more efficiently and prepare better for school tests.

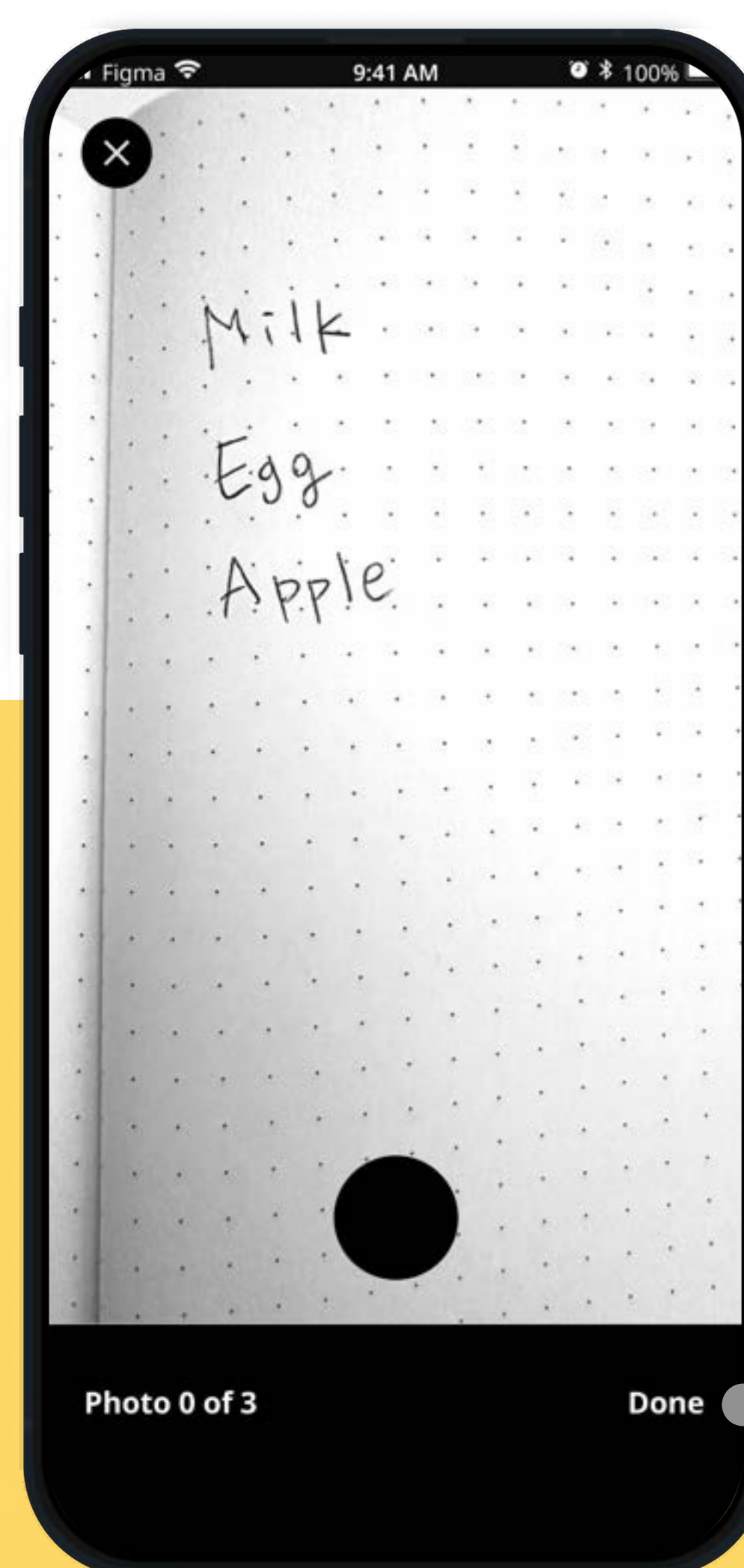
Click on "Create"



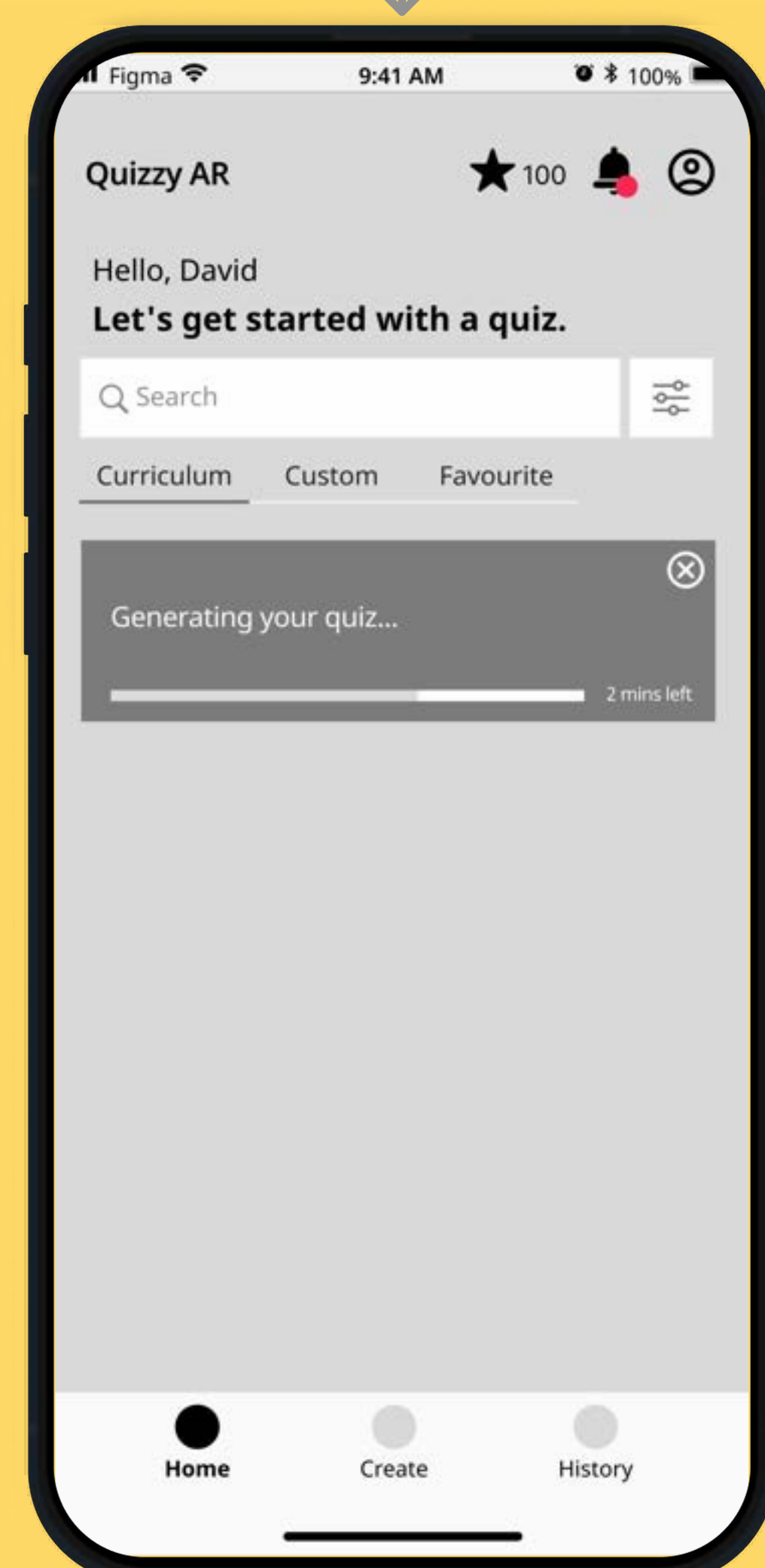
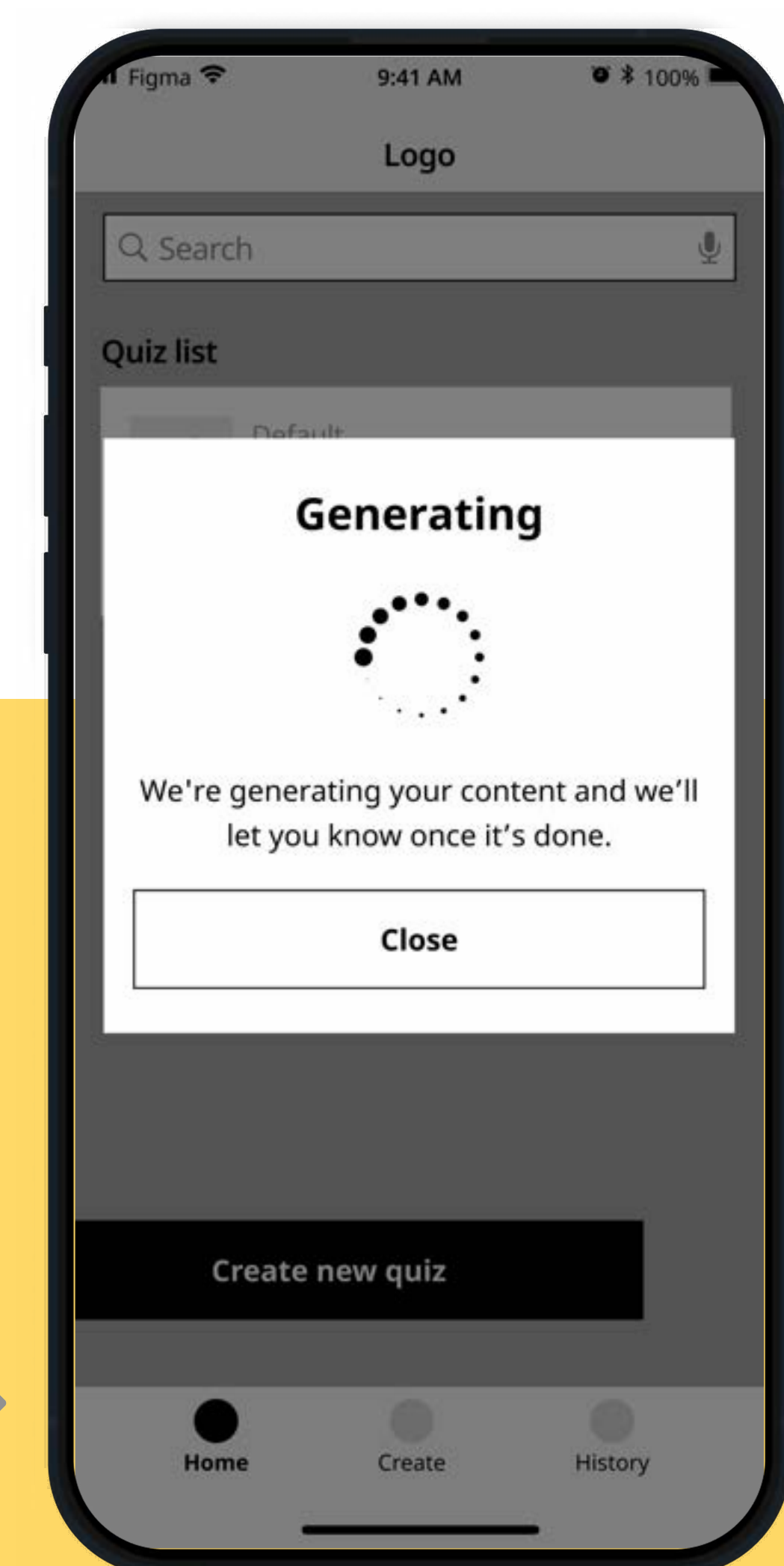
Add Materials



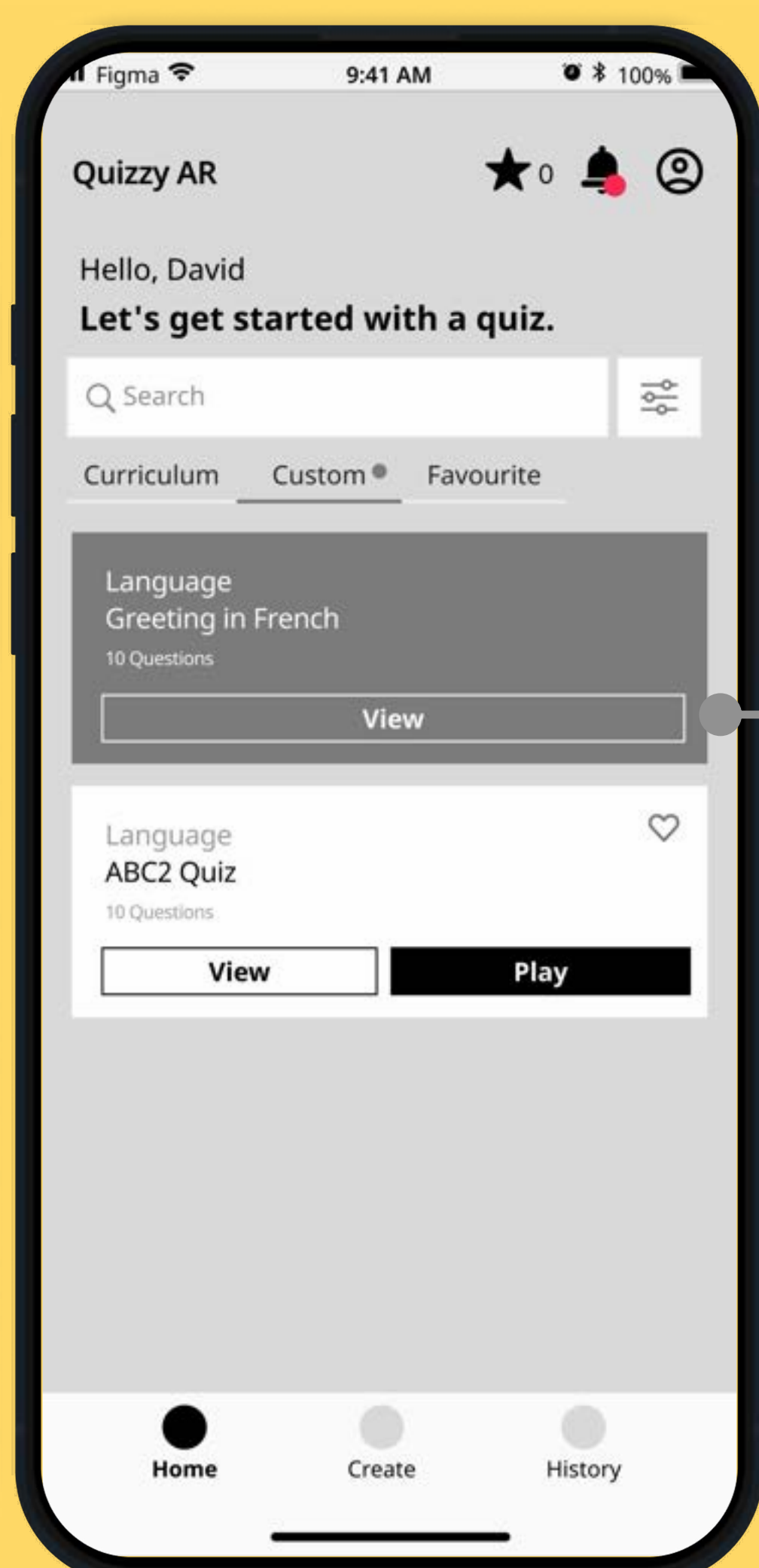
Take Photos



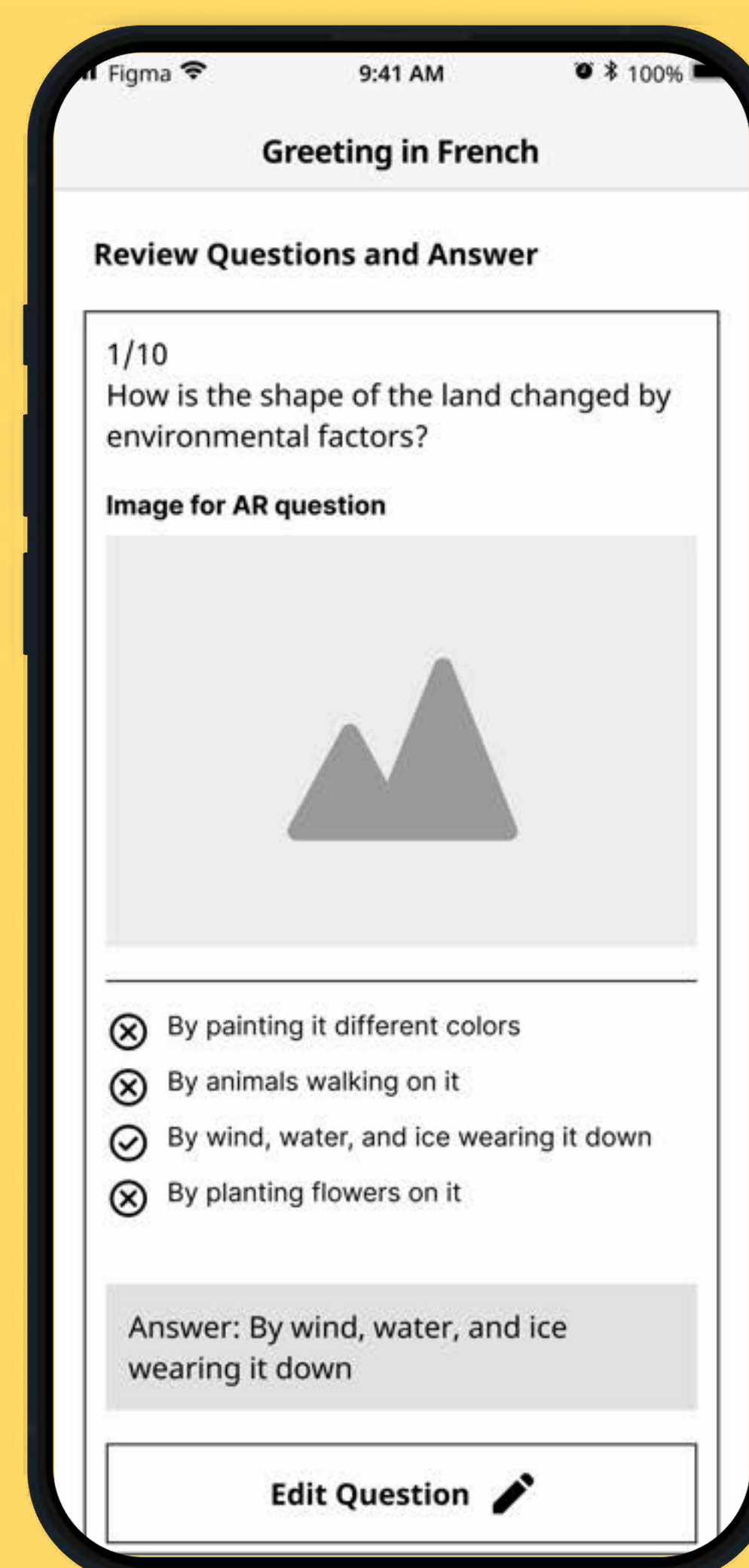
Wait for Generating



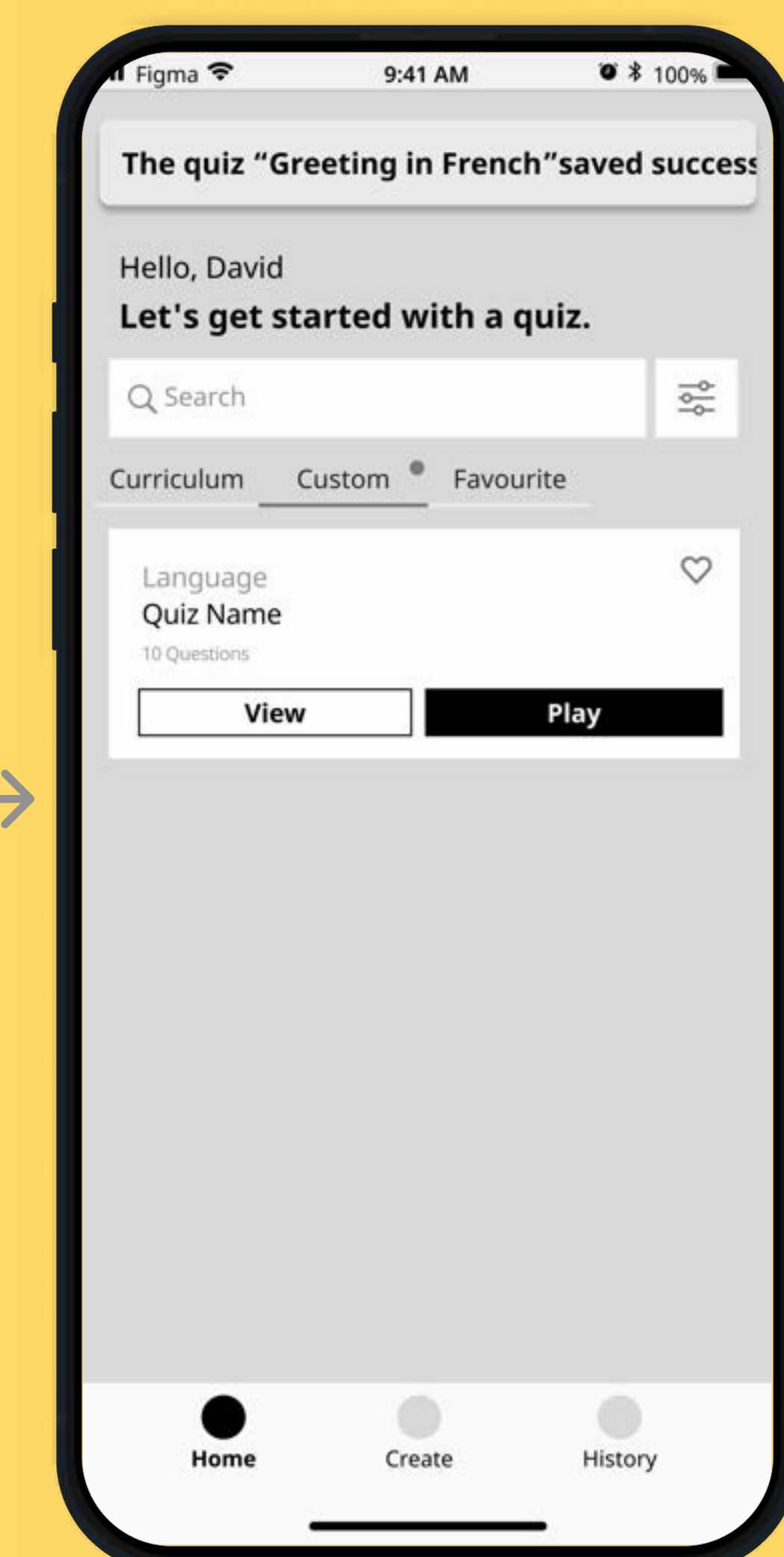
Wait for Generating



View Detail



Check Quiz & Save



Back to Home

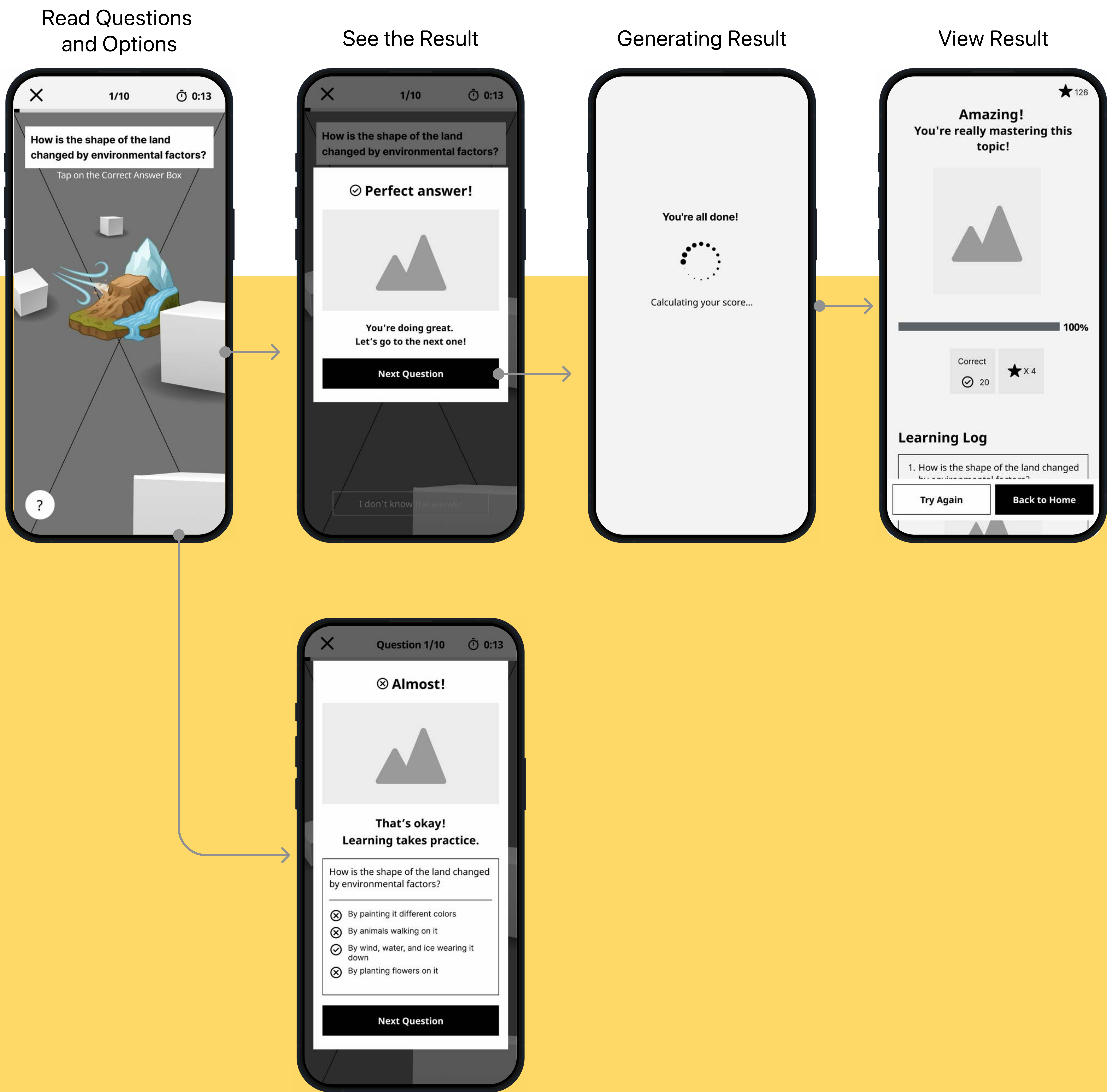


Play Quiz Game in the AR Room

Move, tap, and play through exciting quiz questions in the AR Room. Students can enjoy learning while staying active, helping them better remember what they study through physical interaction.



Full UX flow in Figma file



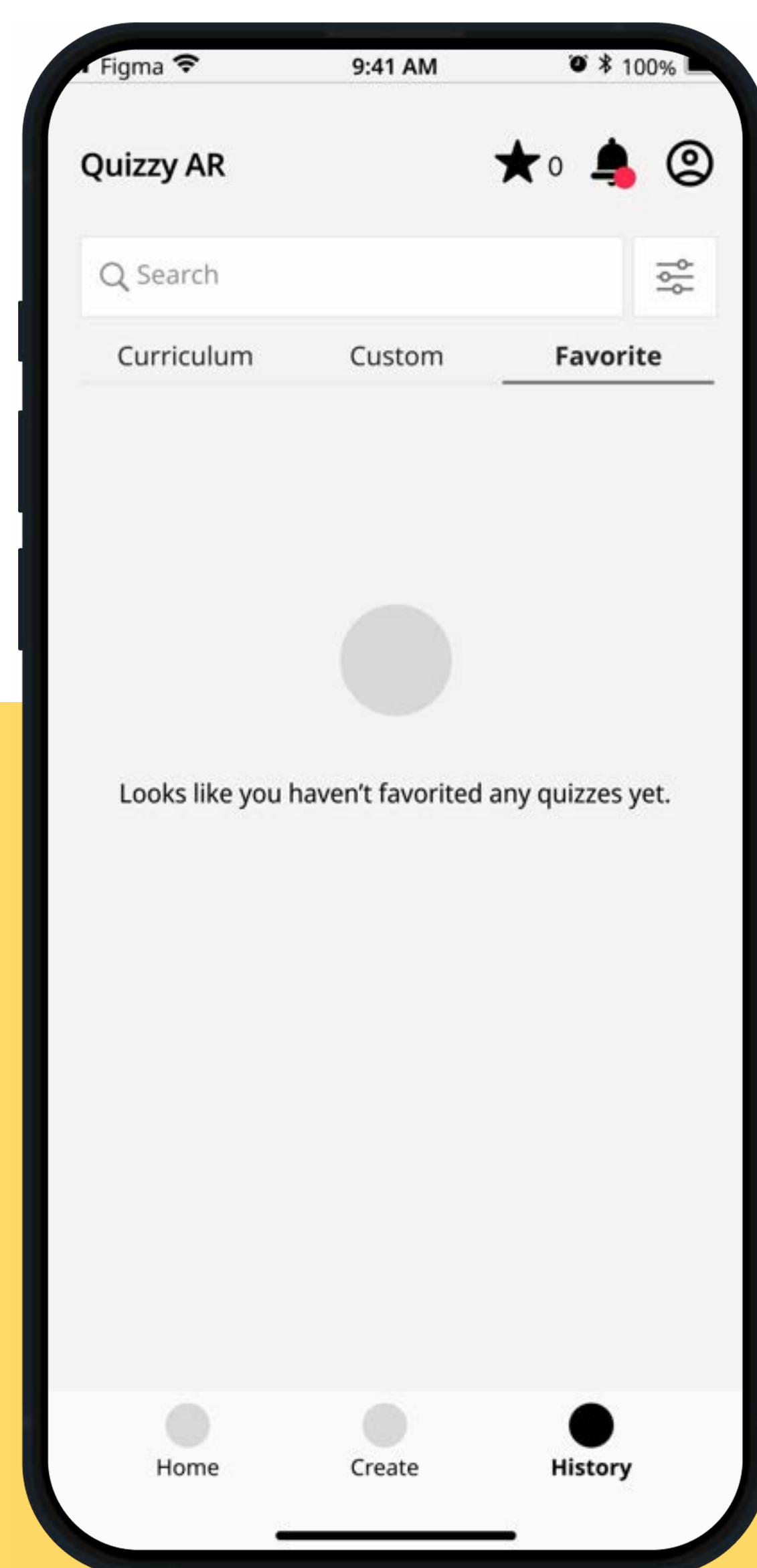


# Wireframes

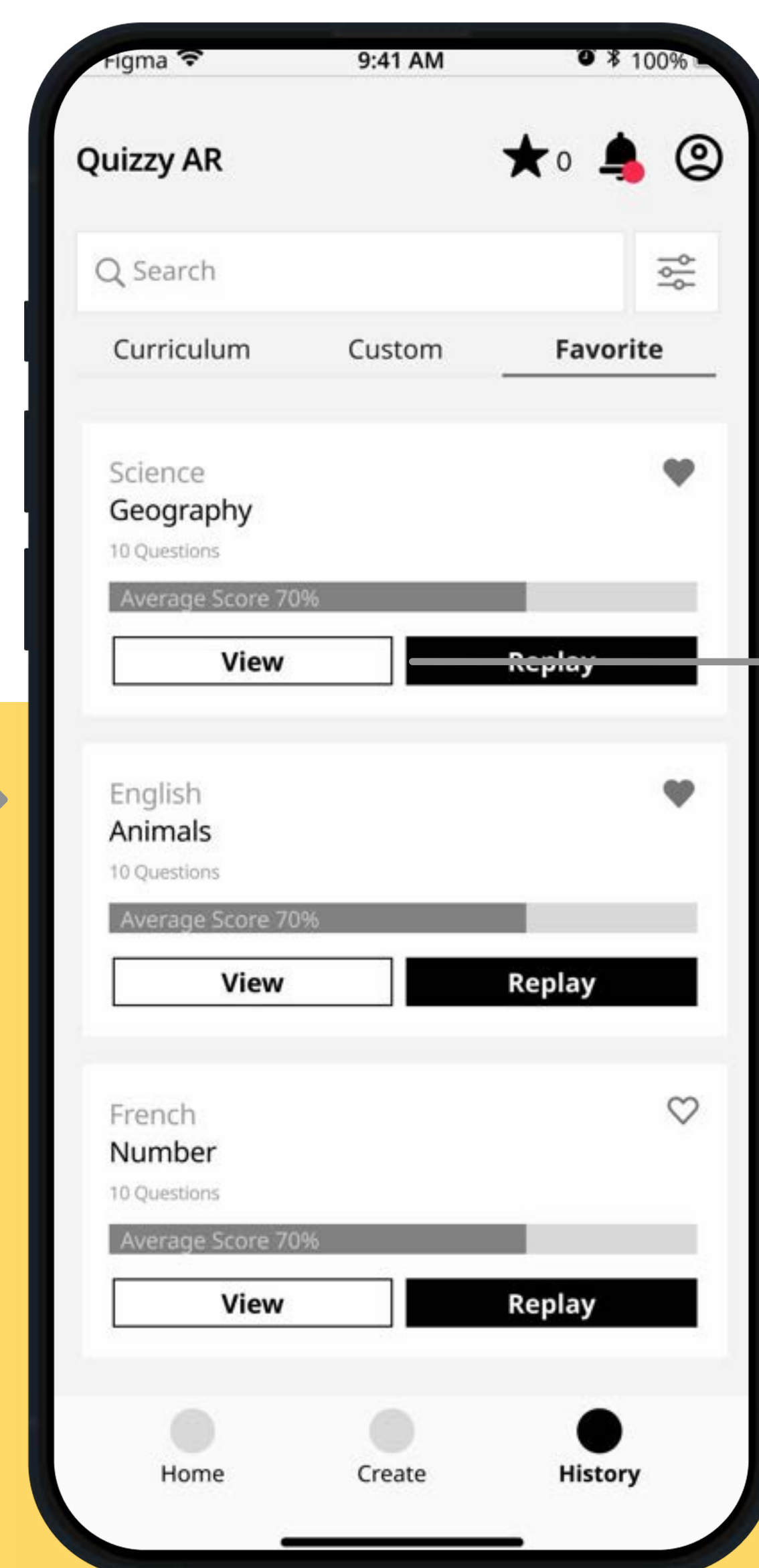
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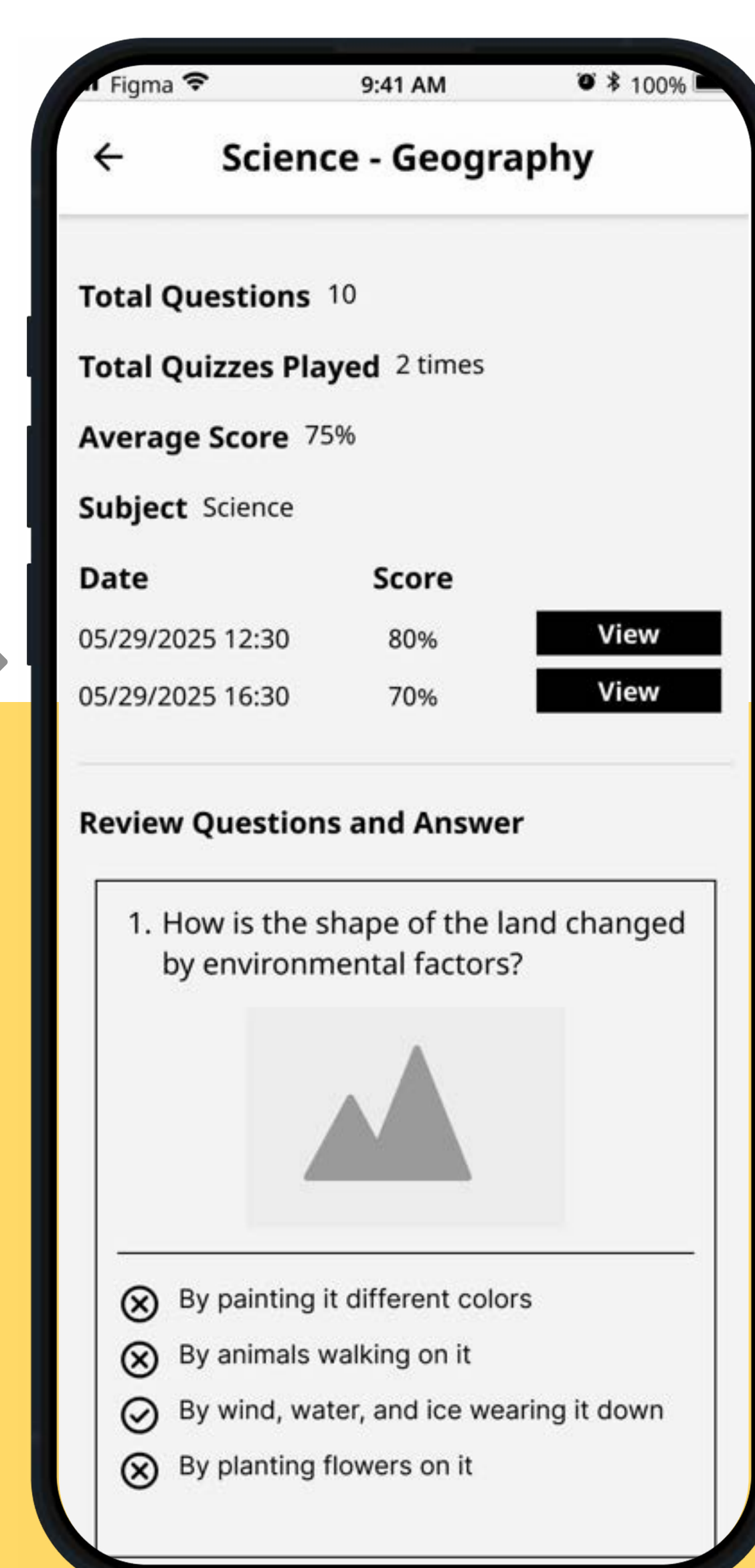
Empty State



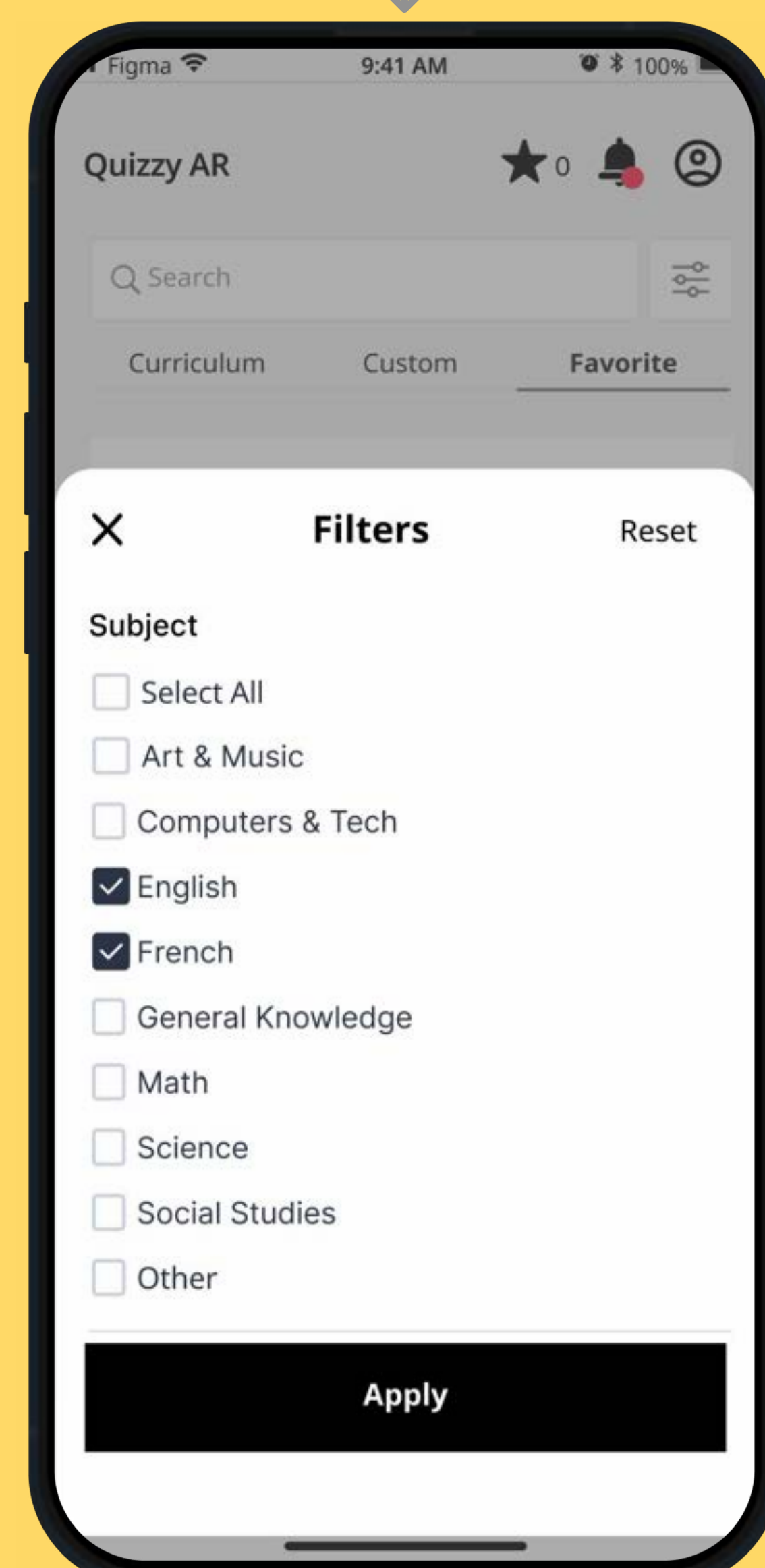
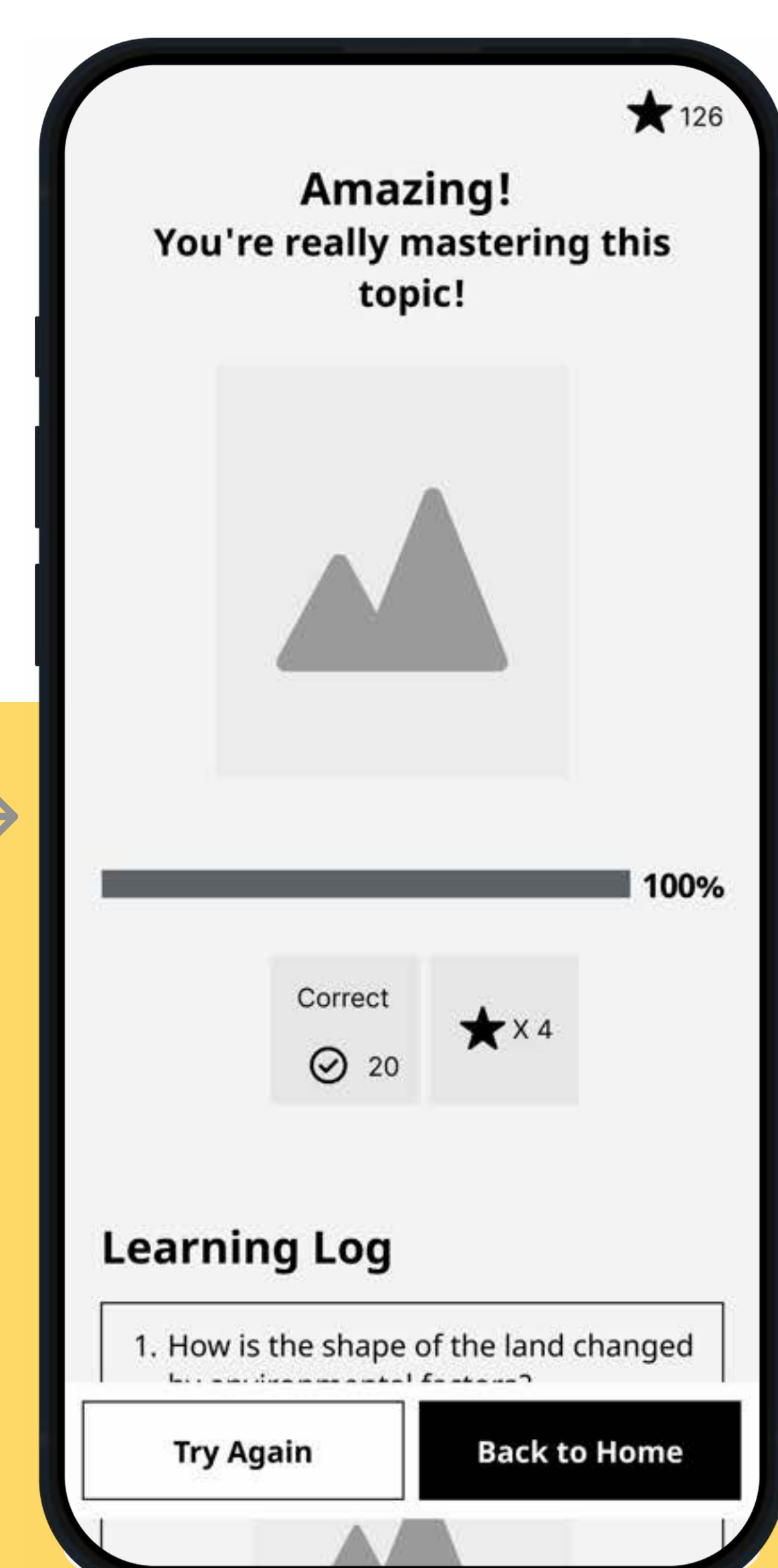
Click on View



See Overview



View Attempt





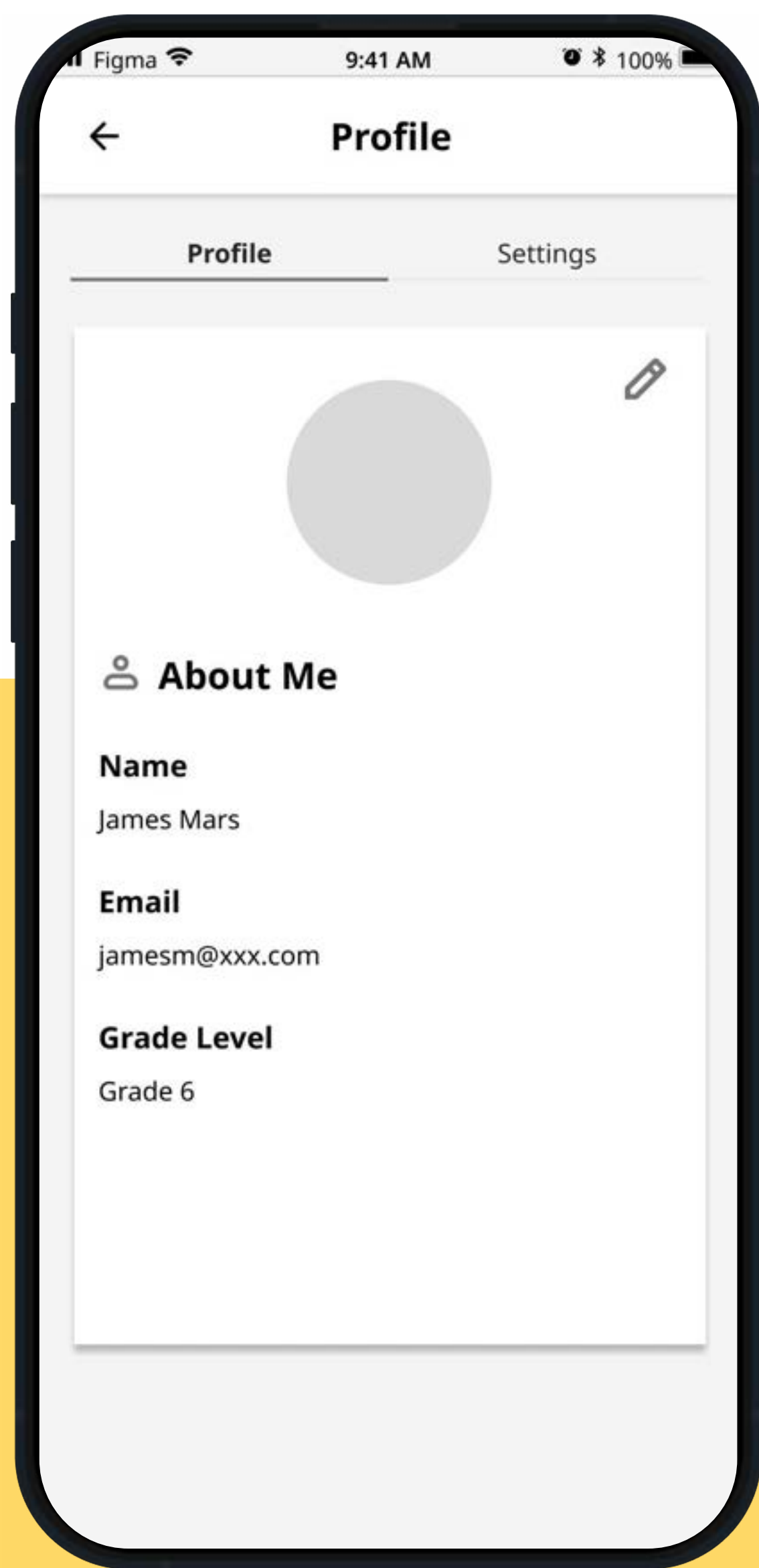
# Personal Profile

Personal Profile stores your name, email, grade level, and lets you upload a profile picture to personalize your account. It also includes Account Settings where you can delete your account or log out at any time.

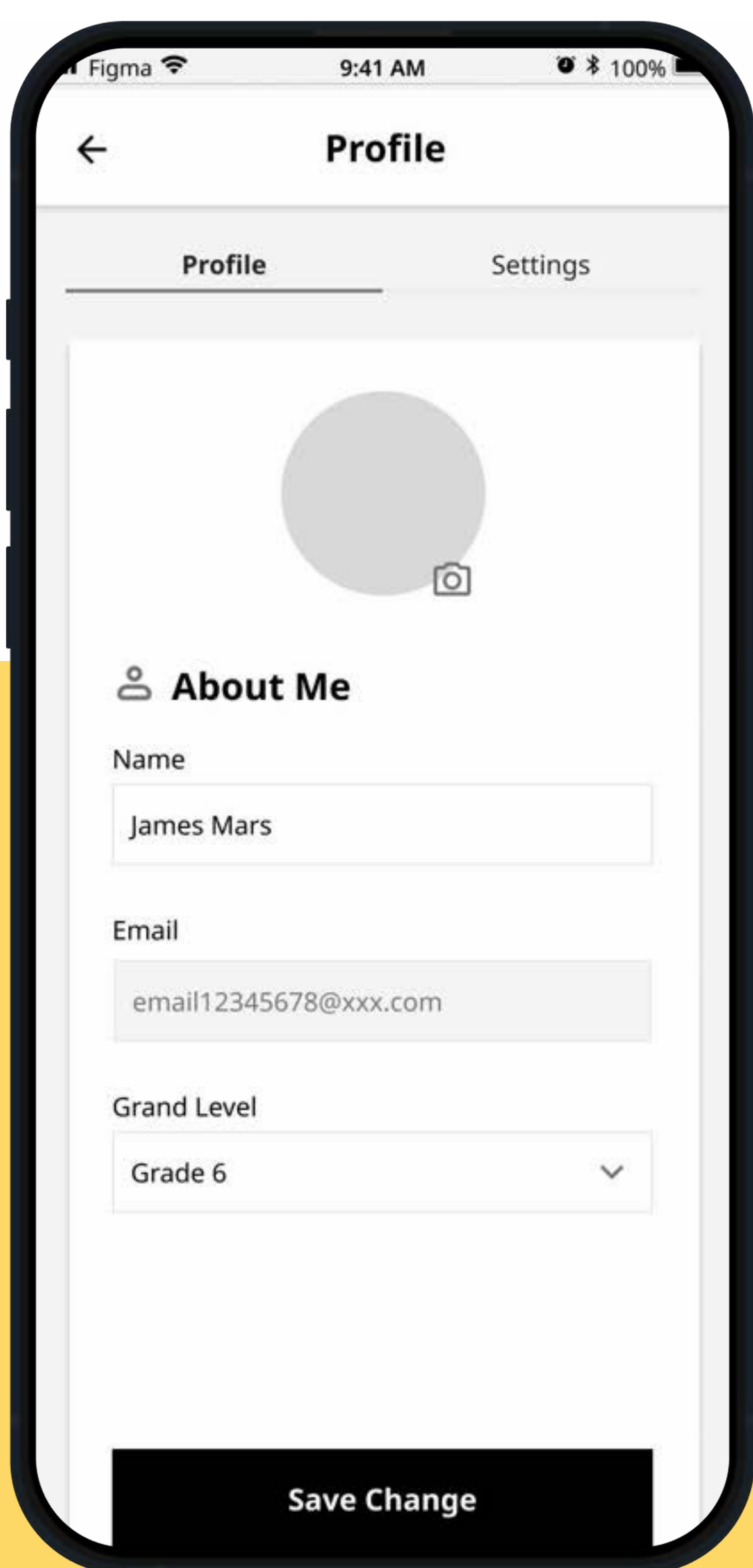


Full UX flow  
in Figma file

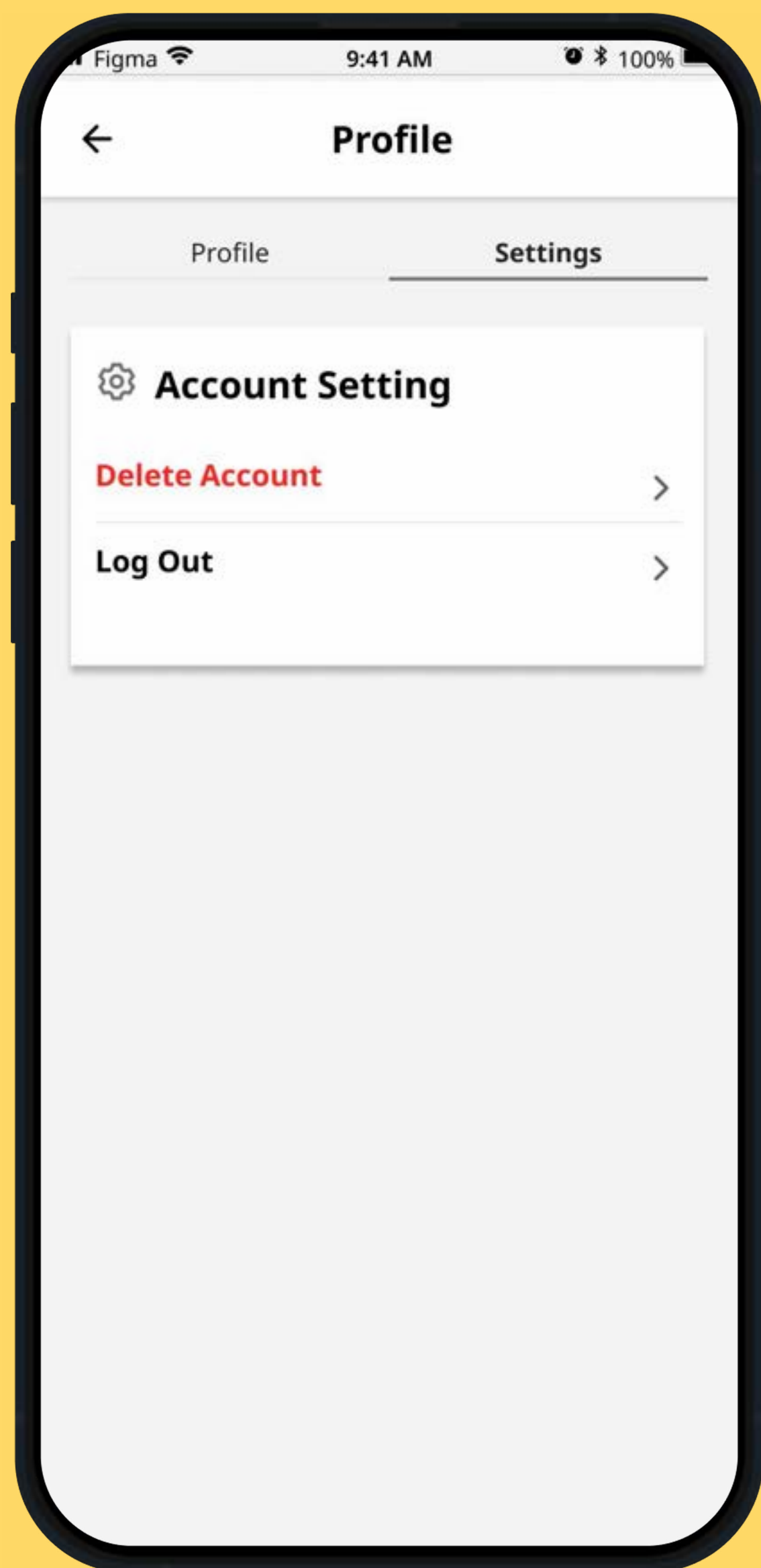
View Profile



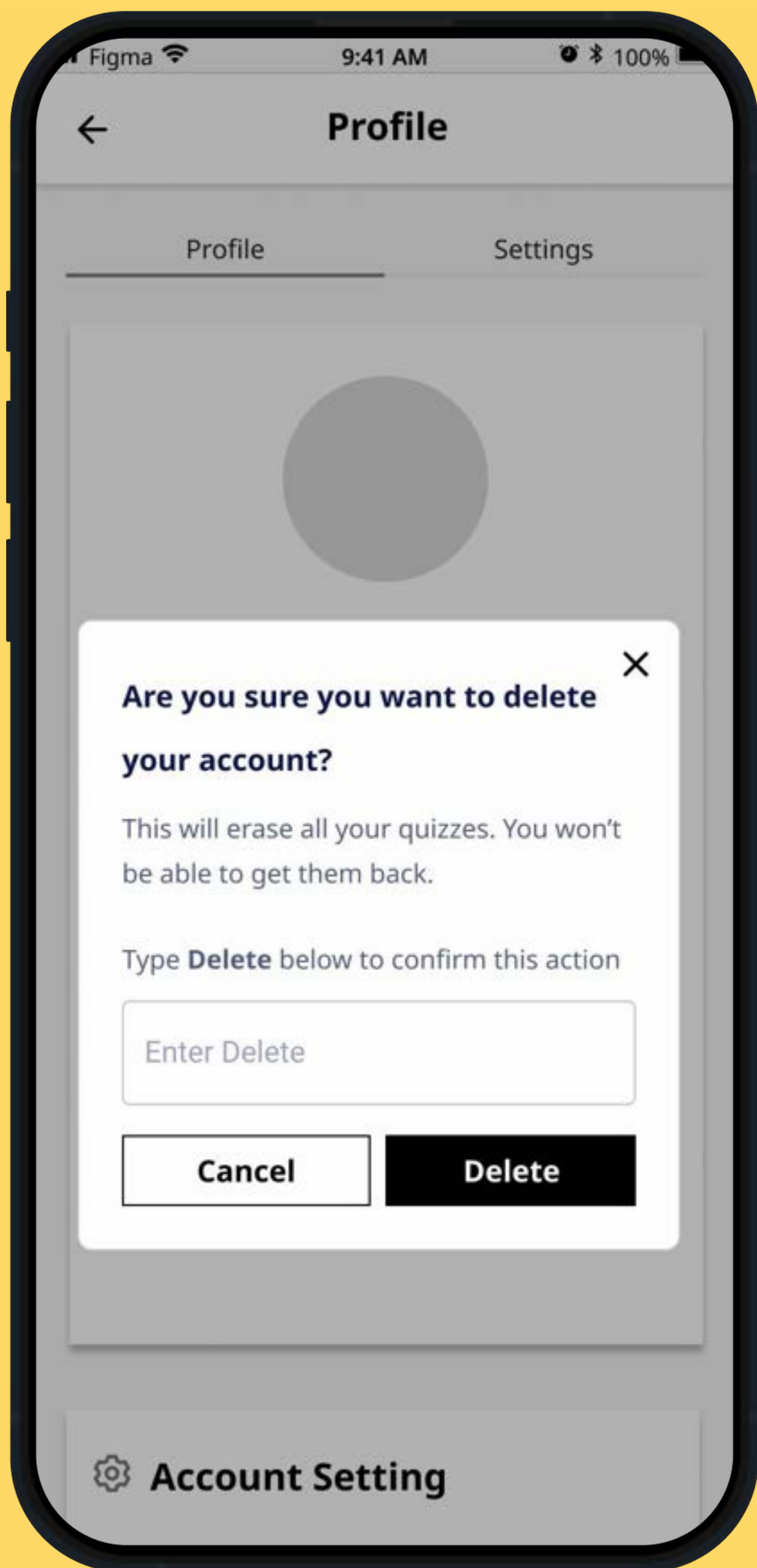
Edit Profile



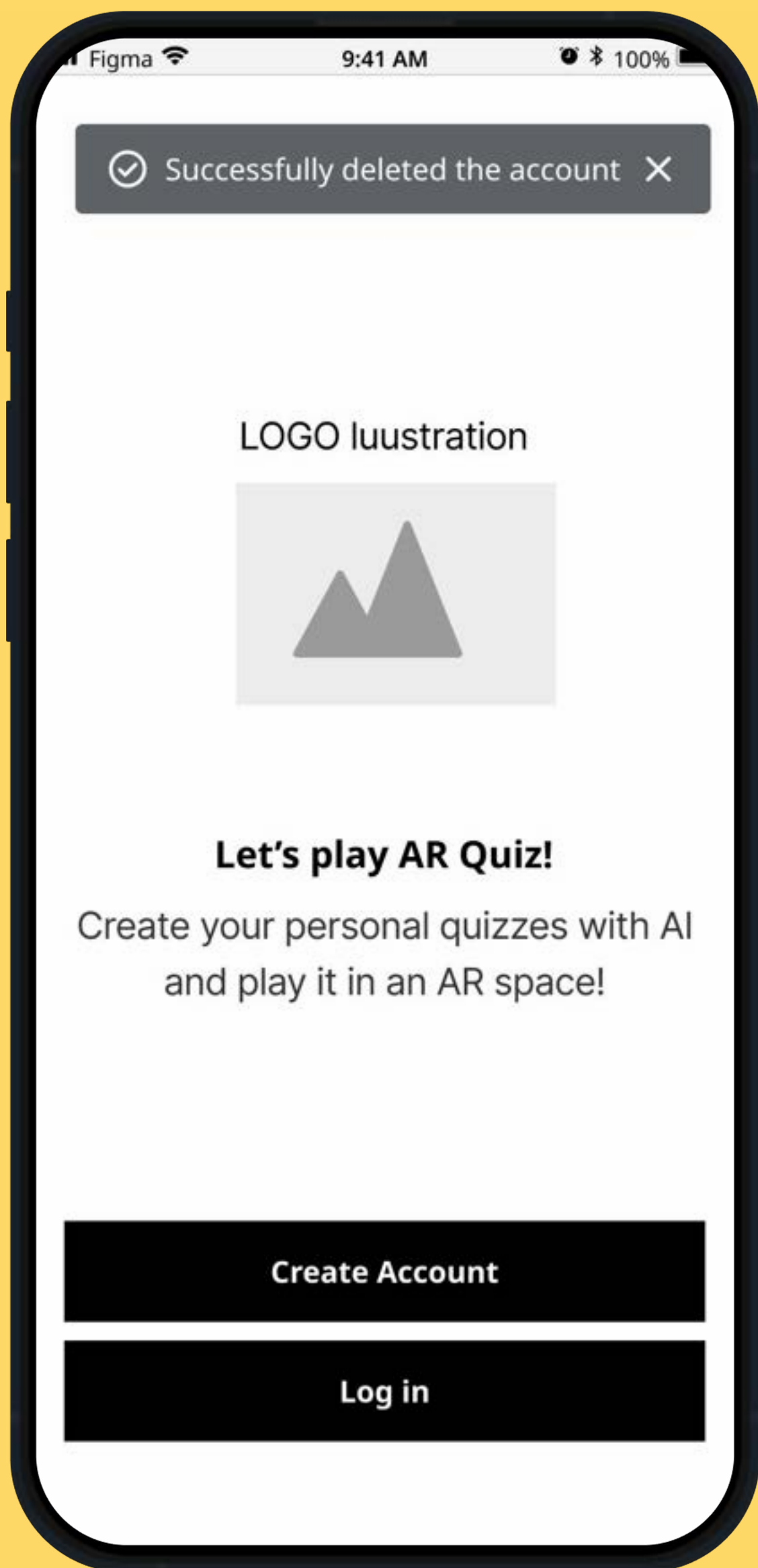
Settings



Delete Account Confirmation



Delete Account Alert

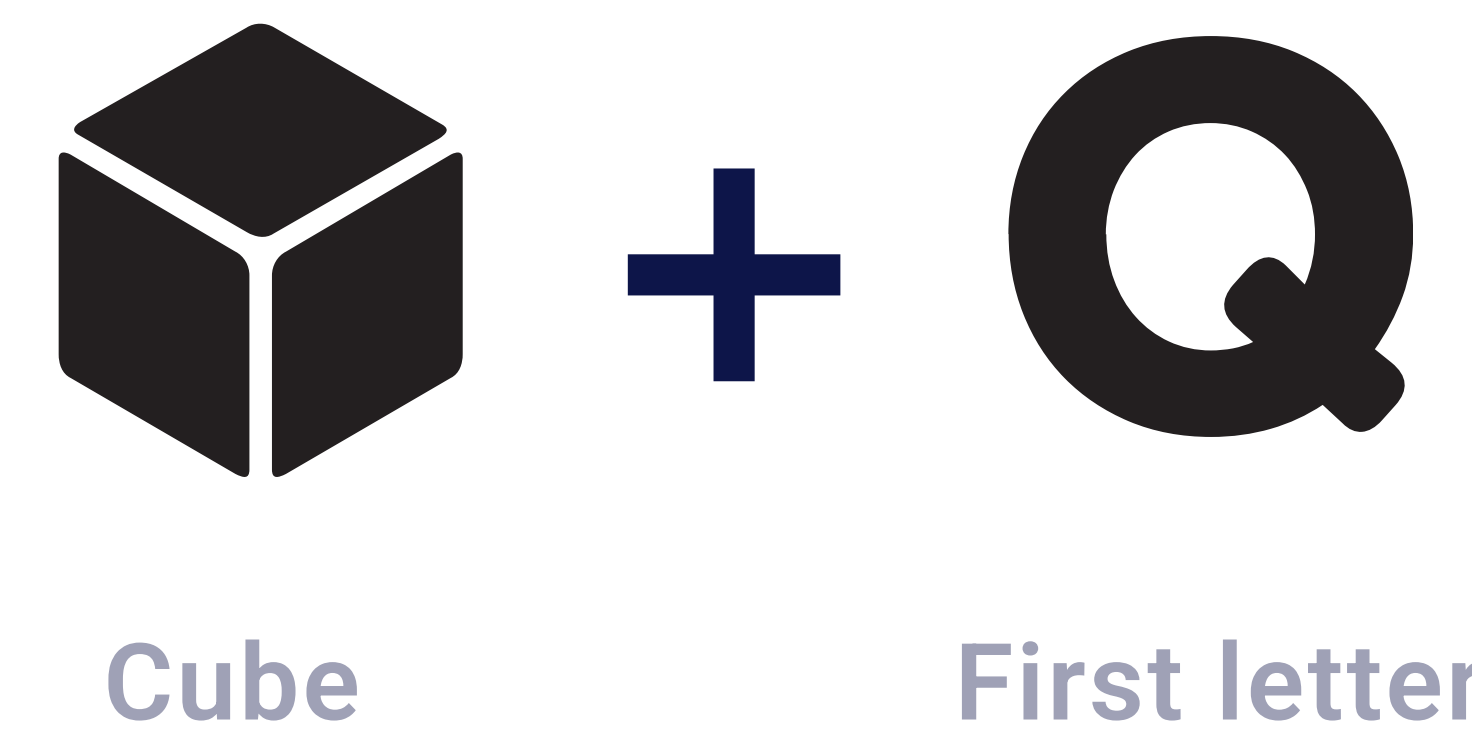




# Branding

## Design Concept

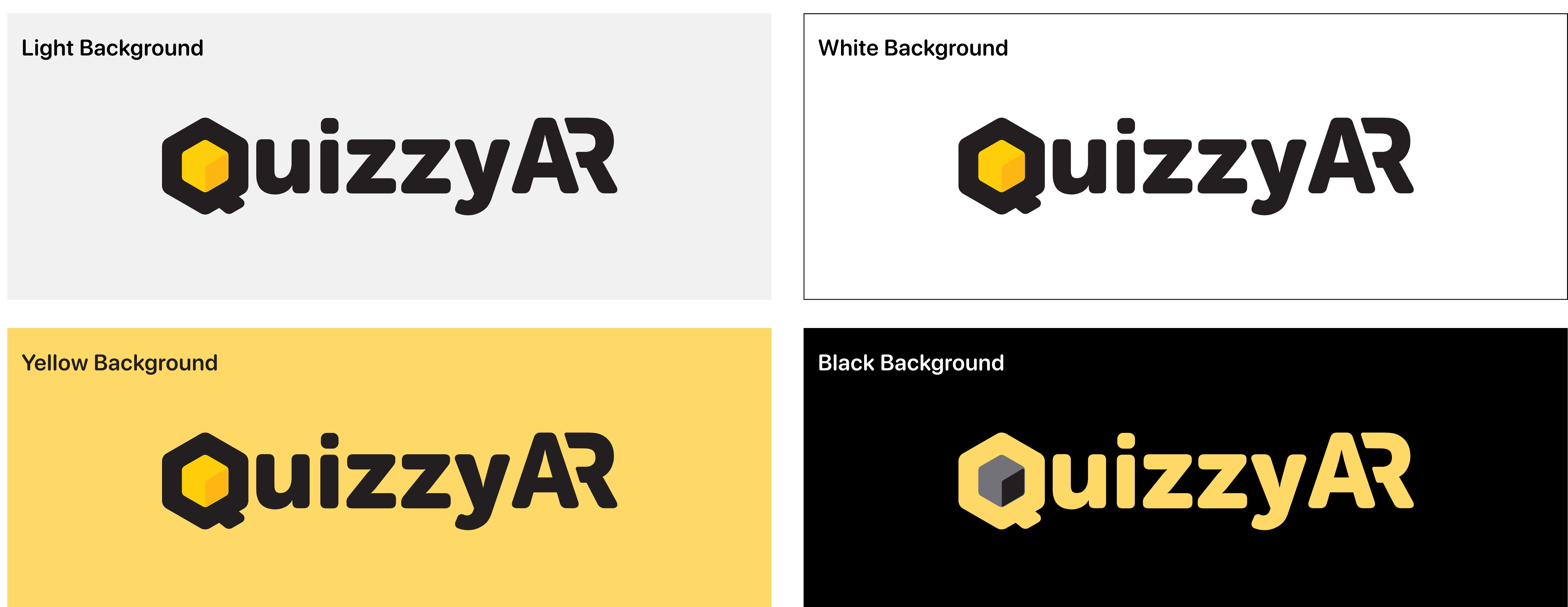
The Quizzy AR logo features rounded corners, giving it a cute and playful look. The letter 'Q' is designed to incorporate a cube, which represents the main object in the AR room.



## Design Structure



## Design Concept



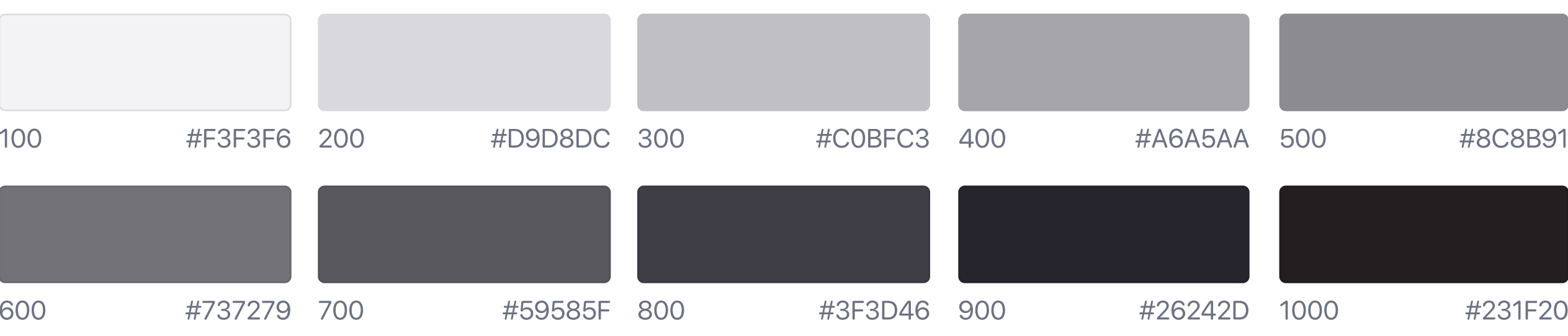


Color Palette

Primary Color



Neutral Color



Supportive Colors



Typography

SF Pro Rounded combines the clean structure of Apple’s SF Pro typeface with softer, friendlier curves. Its rounded terminals give it a warm and approachable tone which is ideal for products aimed at children and families. The font maintains excellent legibility across sizes, making it a smart choice for educational tools used on tablet and other devices.

Aa

SF Pro Rounded

Usage	Size	Line Height
Title 1, Main title	22px	32px
Title 1, Main title		
Title 2, Sub title	18px	26px
Title 2, Sub title / Buttons		
Title 2, Sub title / Big body text		
Title2, Body text	16px	24px
Title3, Body text		
Title3, Body text		
Title3, Body smaller text	14px	22px
Title3, Body smaller text		
Title3, Icon title	12px	20px
Title3, Icon title		



# UI Kit

## Inputs

Enabled

Active

Disabled

Primary

Primary Small

Secondary

Secondary Small

+ Button +

+ Button +

+ Button +

+ Button +

+ Button +

+ Button +

+ Play +

+ Play +

+ Button +

+ Play +

+ Play +

Selected

Unselected

Selection

Selection

unchecked

checked

☐

☒

Unfavourited

Favorited

☐

☒

Default

Active

Disabled

Error

Label

Label

Label

Label

Input

Input

Input

Input

Something is wrong

Default

Active

Disabled

Error

Label

Label

Label

Label

Choose

Choose

Choose

Choose

Arial

Something is wrong

## Icons

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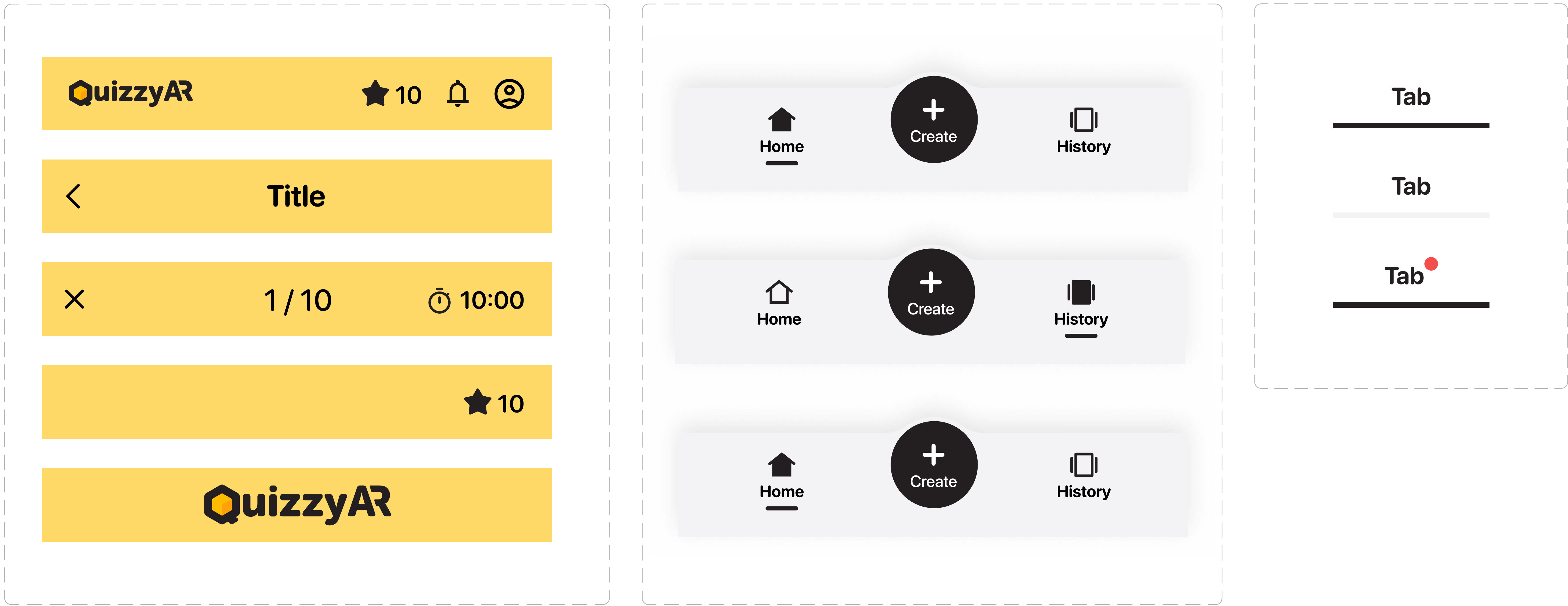
✕

✓

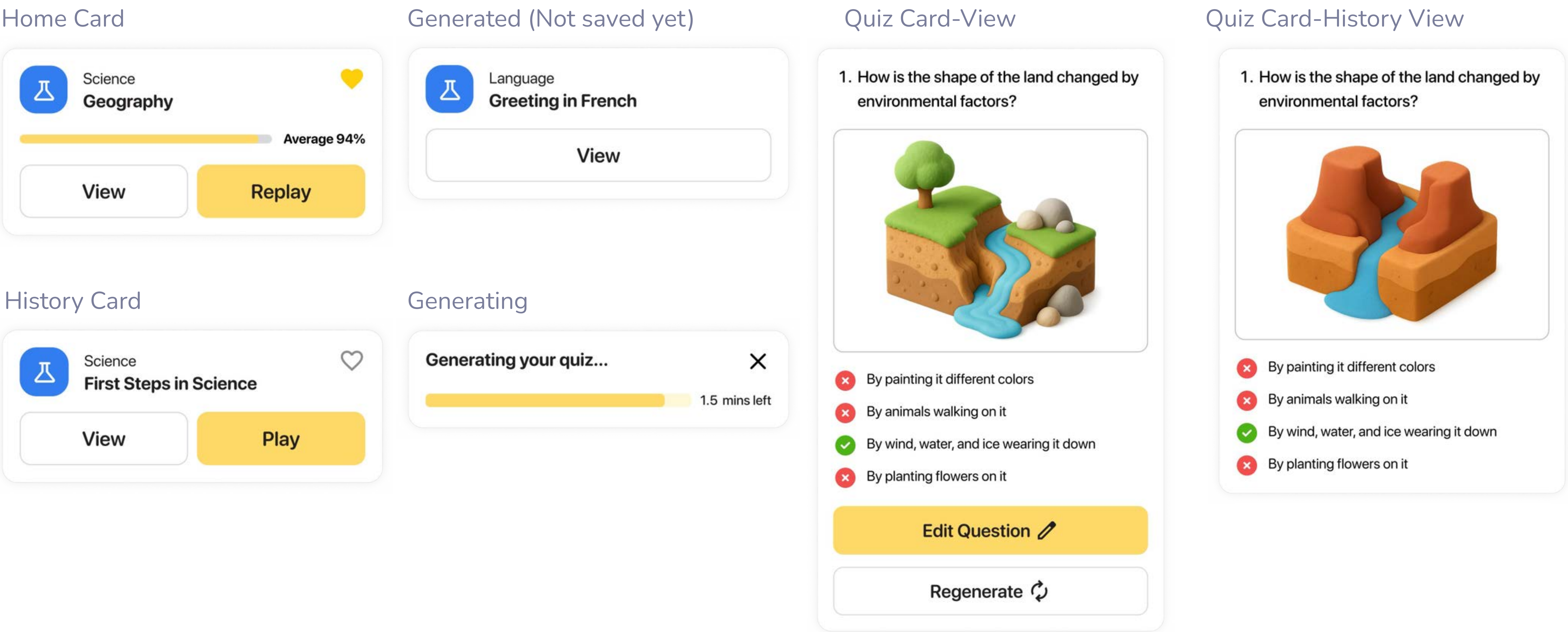
🧪 📊 🌐 ABC 🚶



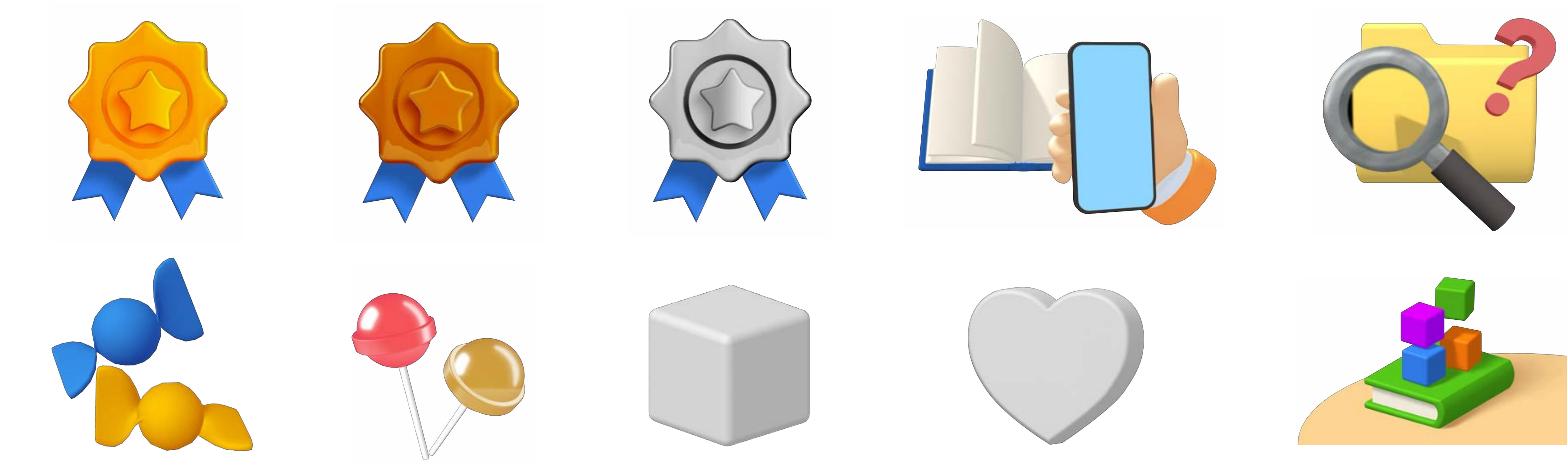
Navigation



Display



Illustrations

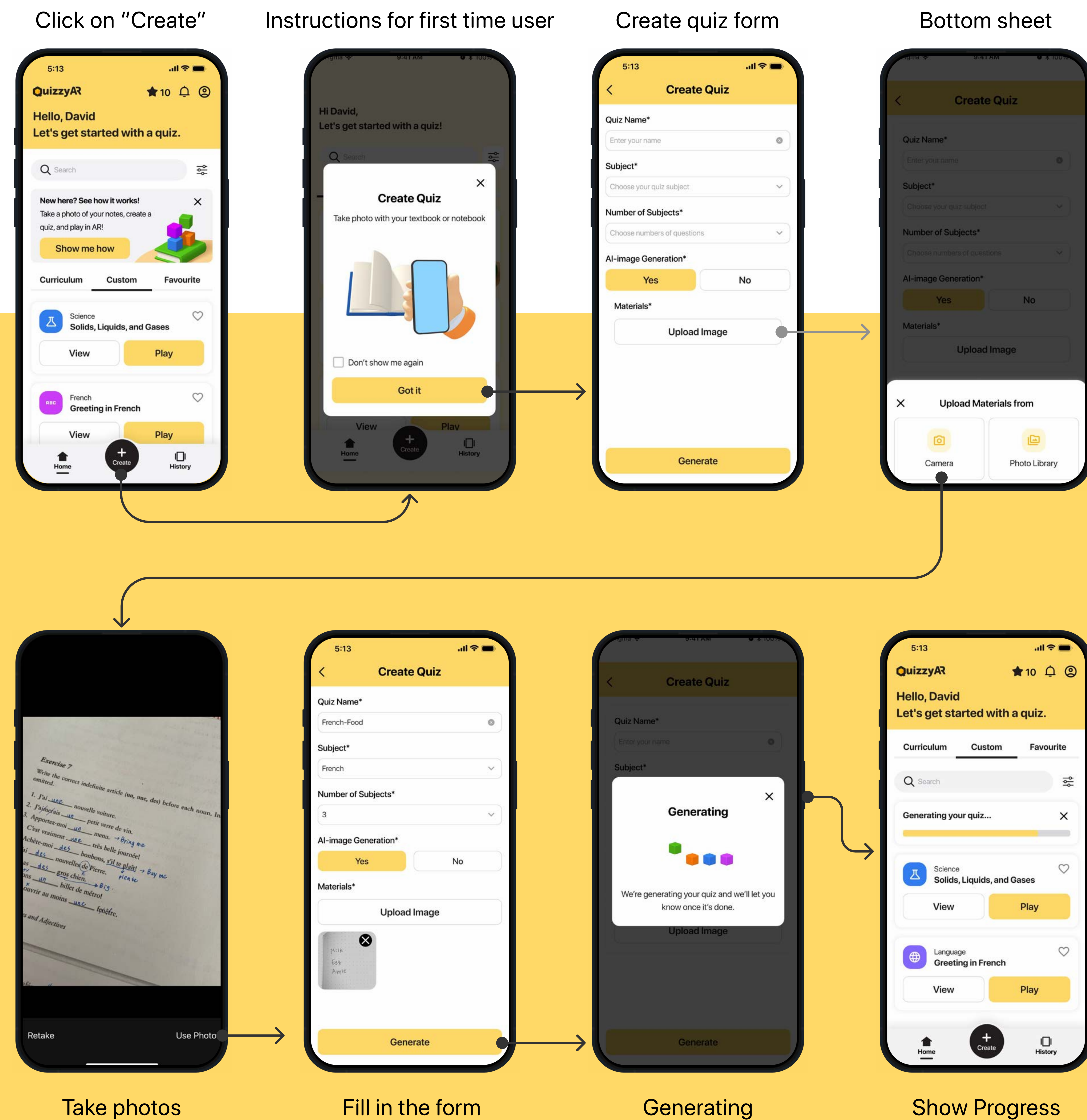




# Mockups

## Create Quiz using AI

Users can generate custom quizzes that match the actual content by uploading notes and textbook pages. This helps students study more efficiently and prepare better for school tests.





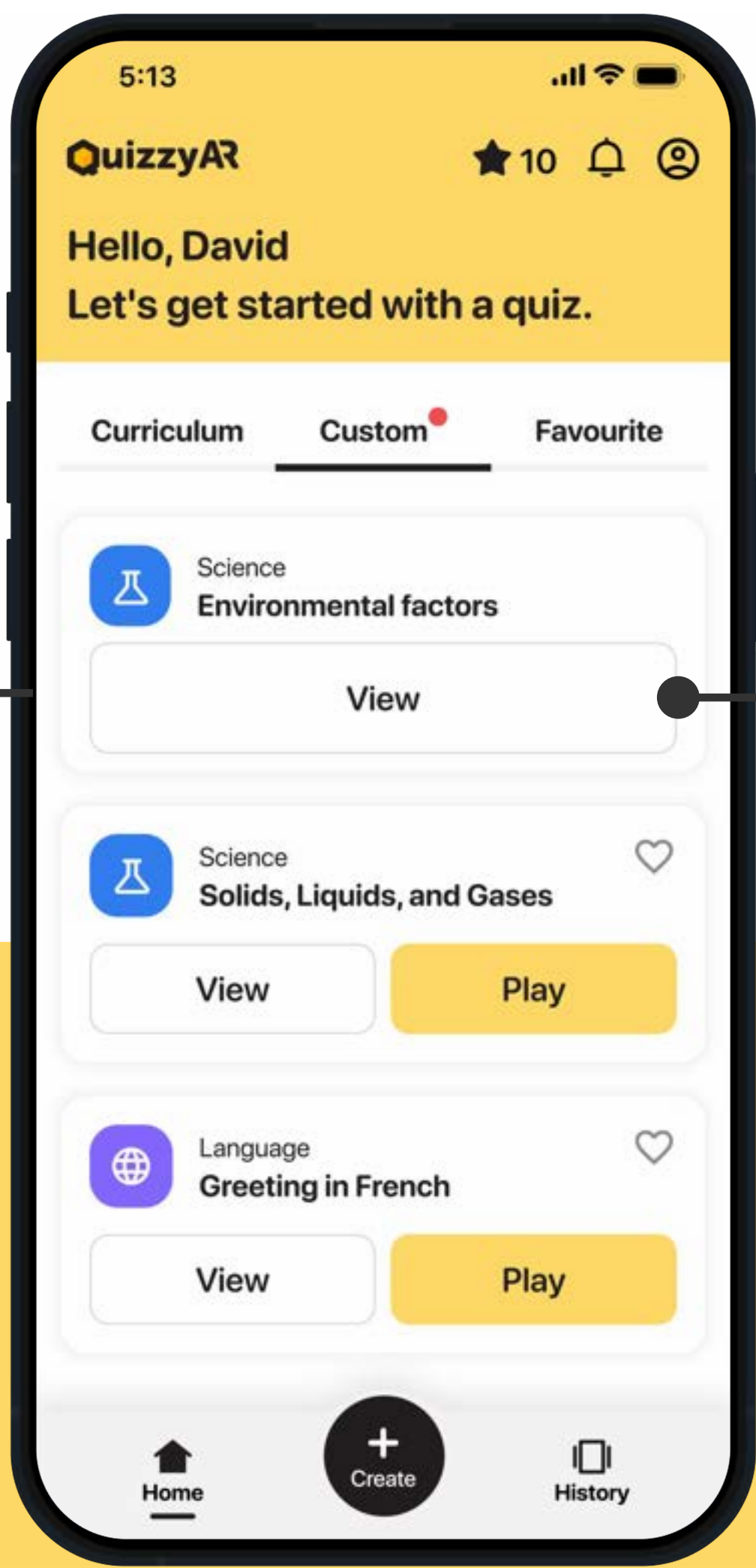
## Edit and Delete Quiz

Users can edit their custom quizzes, regenerate quiz questions, update images for AR questions, or delete quizzes that no longer need. This helps keep quizzes relevant, organized and engaging for students.

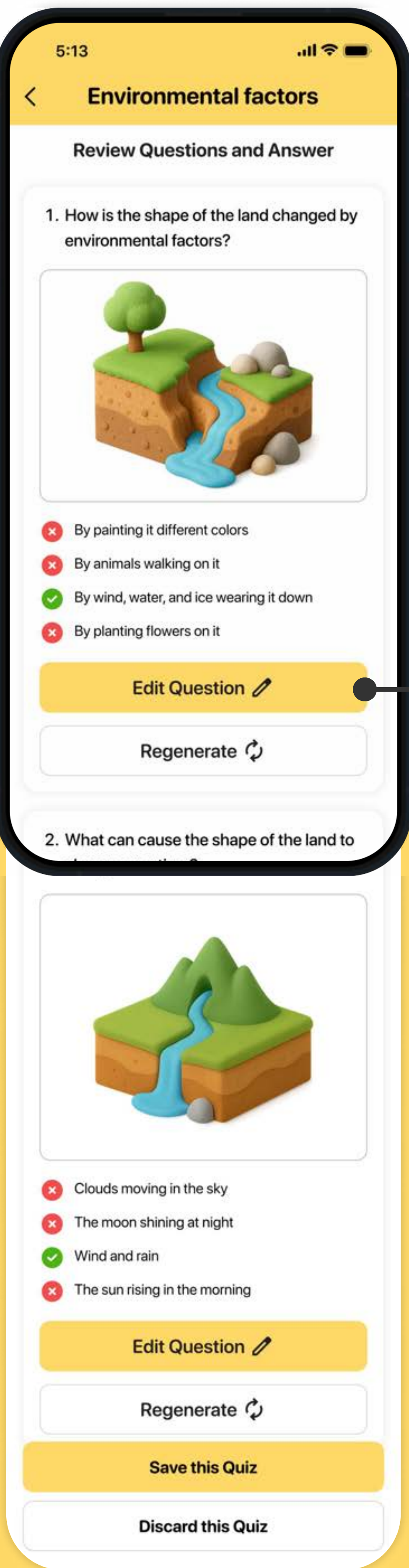


Full UX flow  
in Figma file

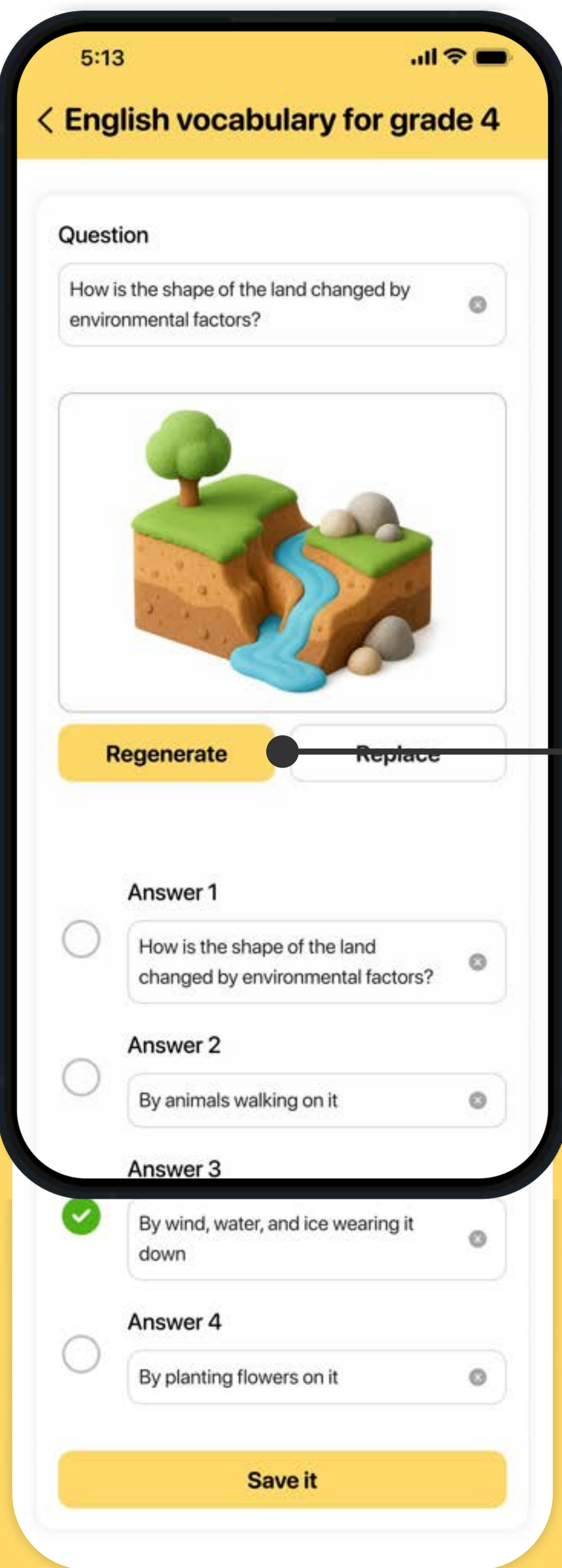
Click on "View"



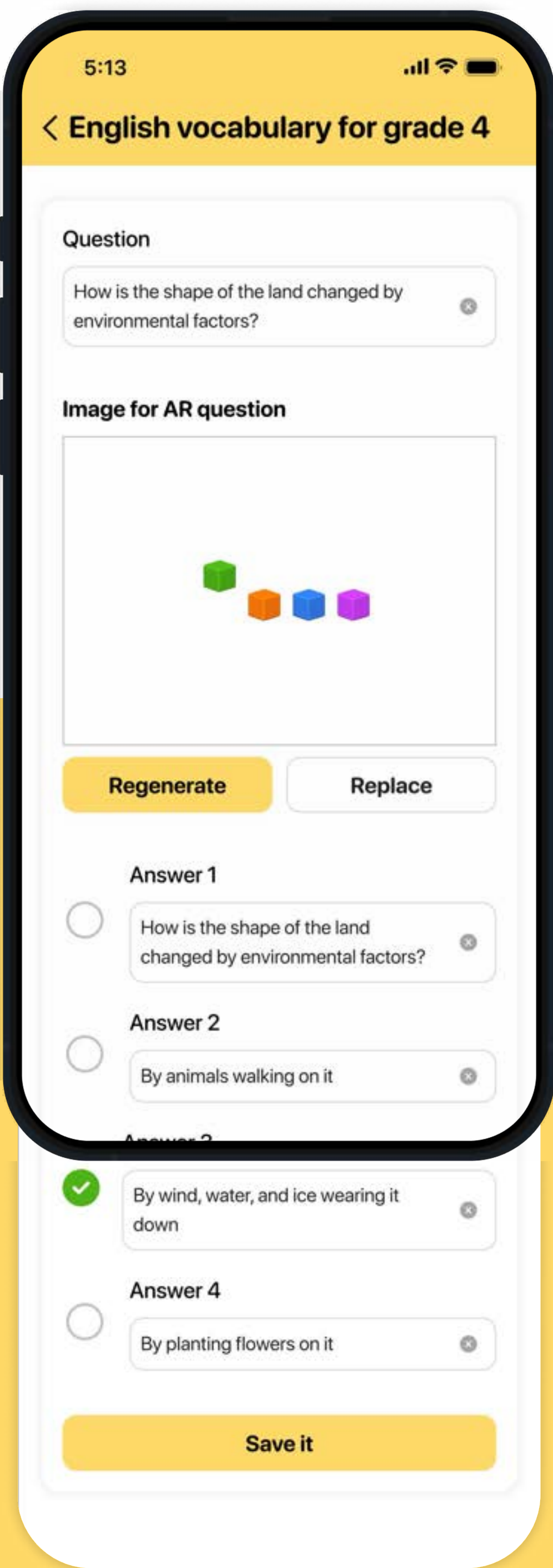
Check quiz generation



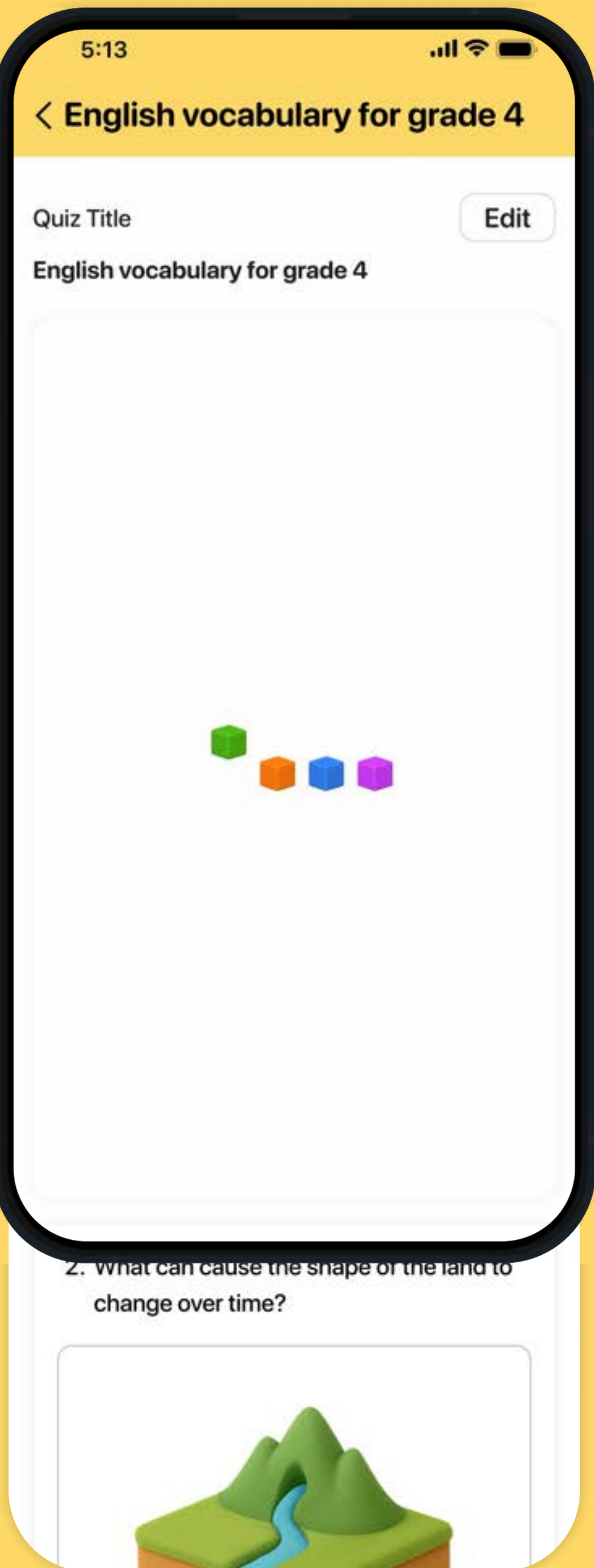
Edit quiz



Regenerate the Image



Regenerate the quiz





# Mockups

## Play Quiz Game in the AR Room

Move, tap, and play through exciting quiz questions in the AR Room.  
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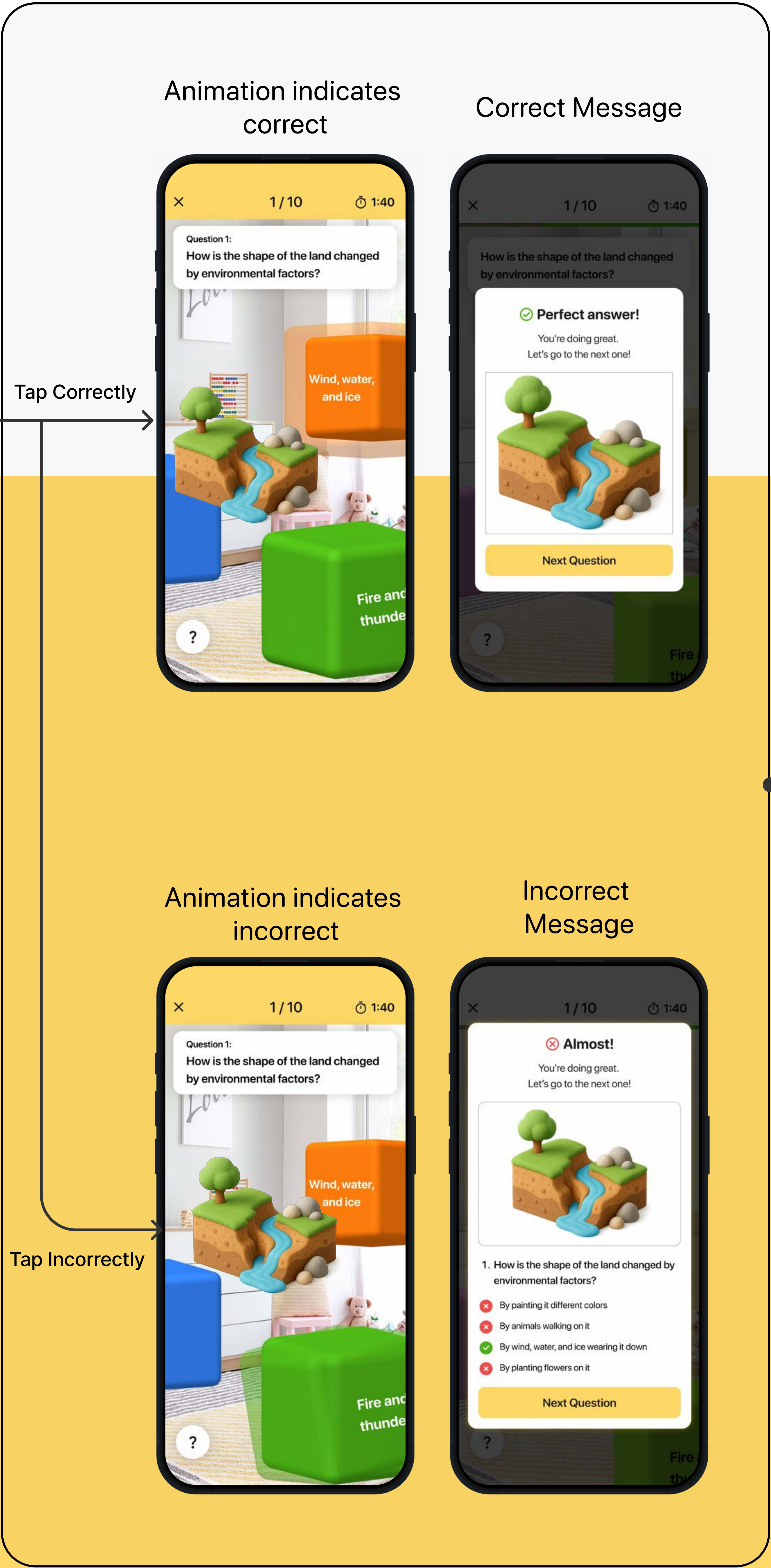






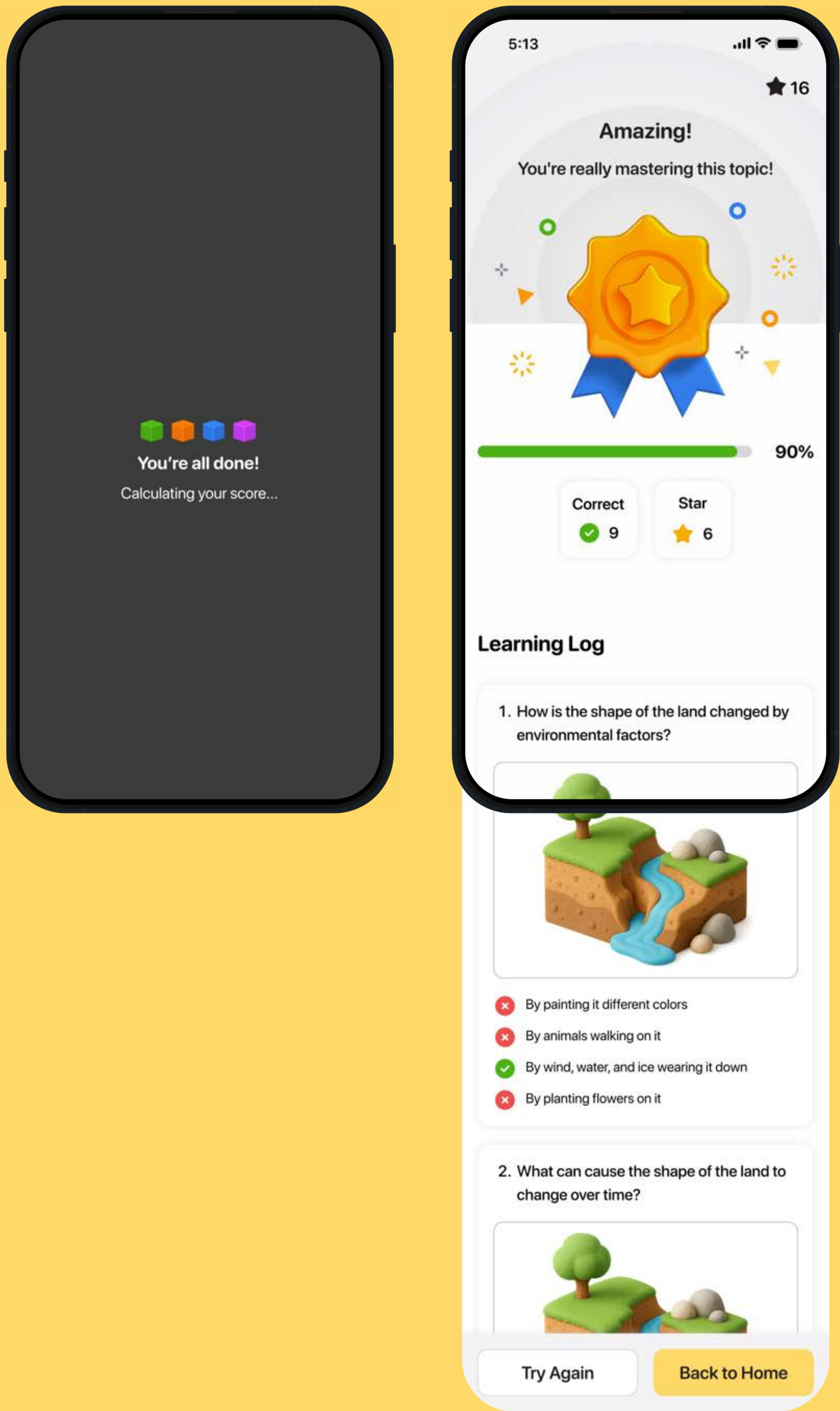
Full UX flow  
in Figma file

Game Loop



Generating Results

Quiz Results



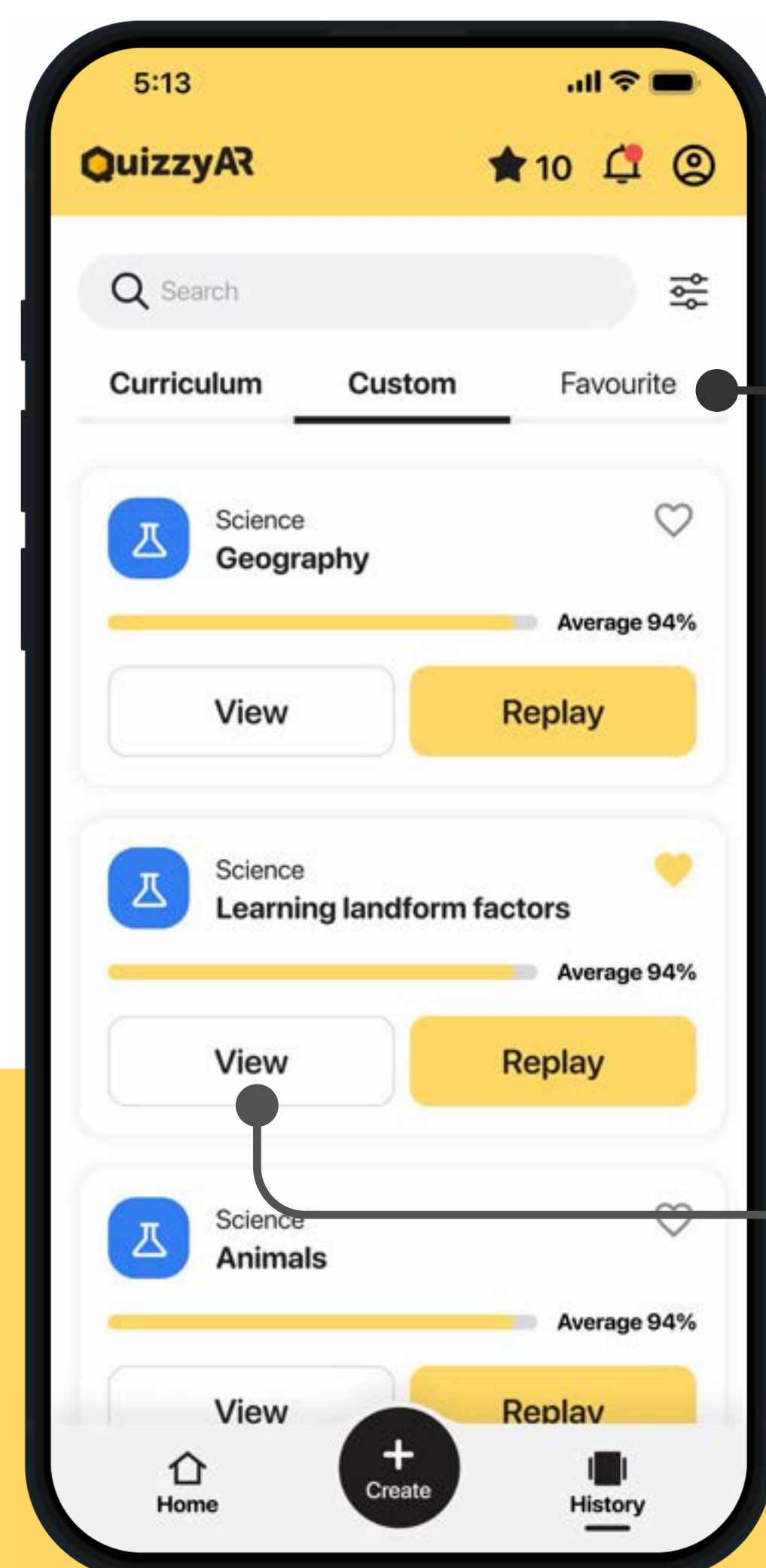


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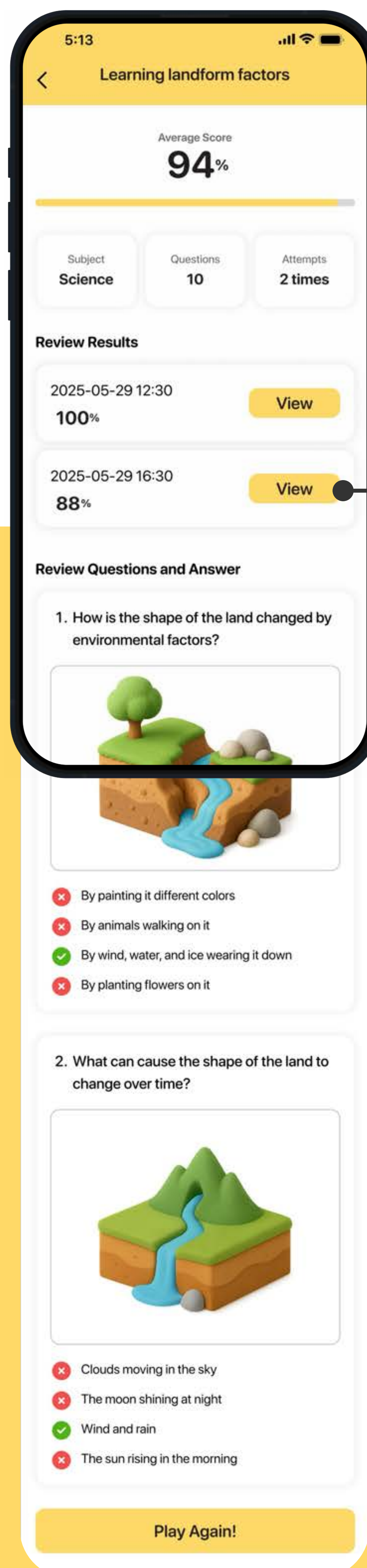
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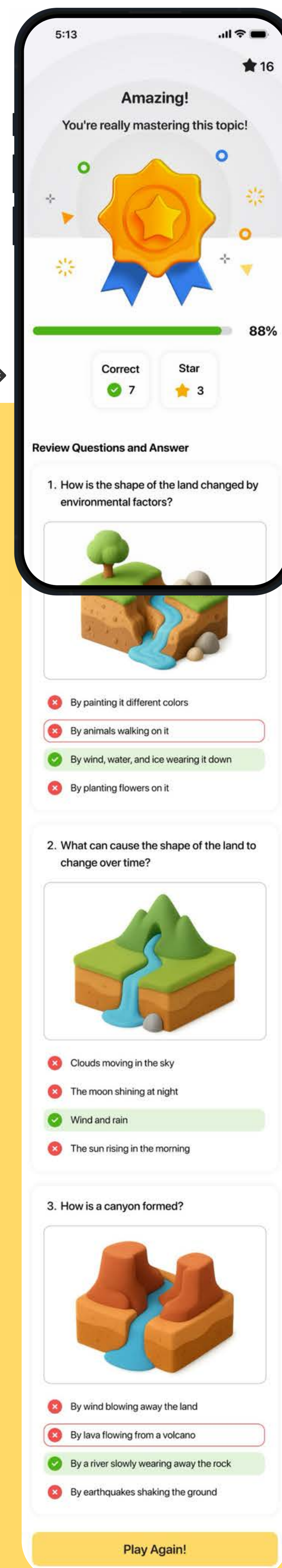
Click on one quiz



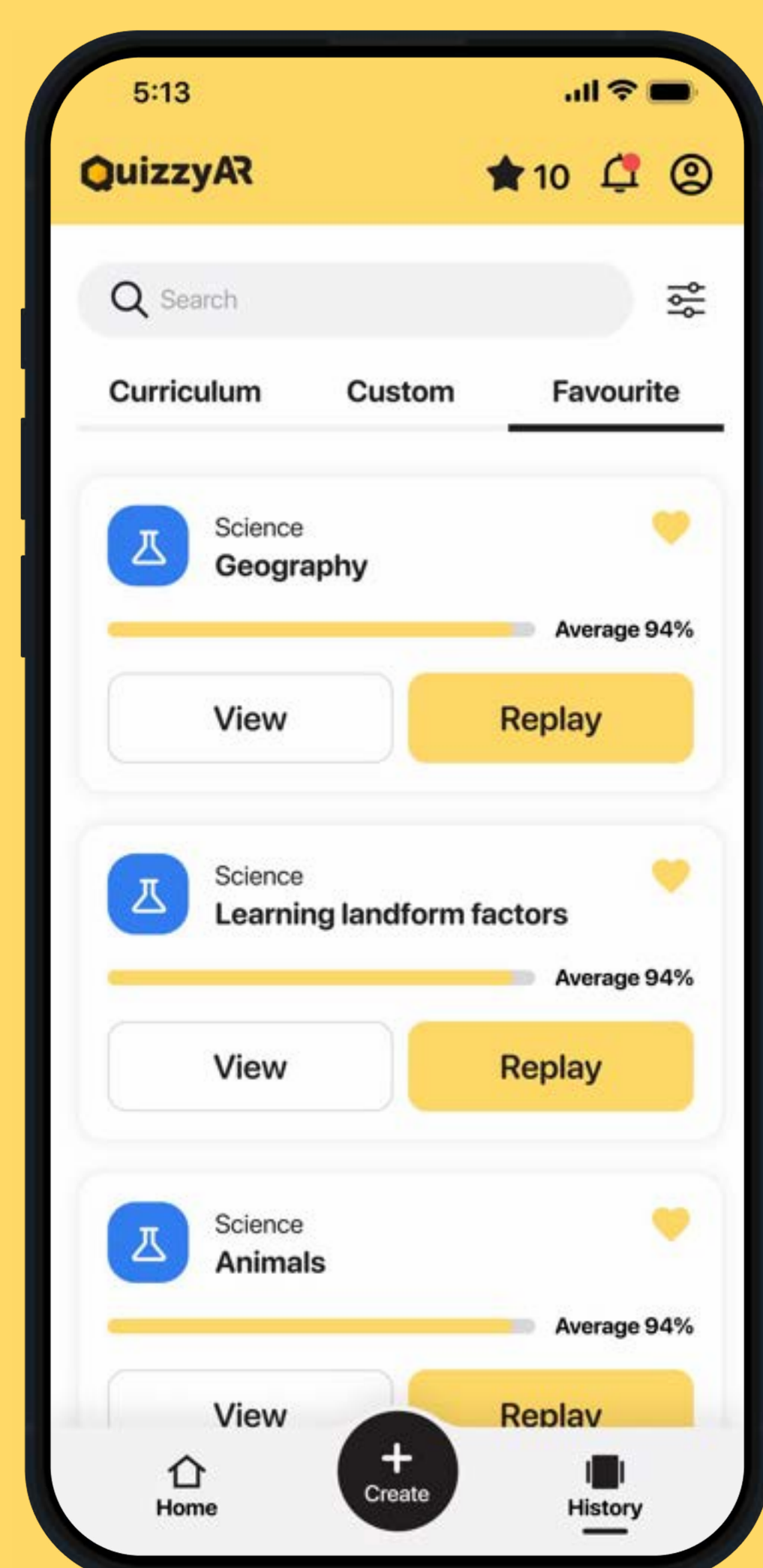
Click on One Attempt



See Results



See Favourite



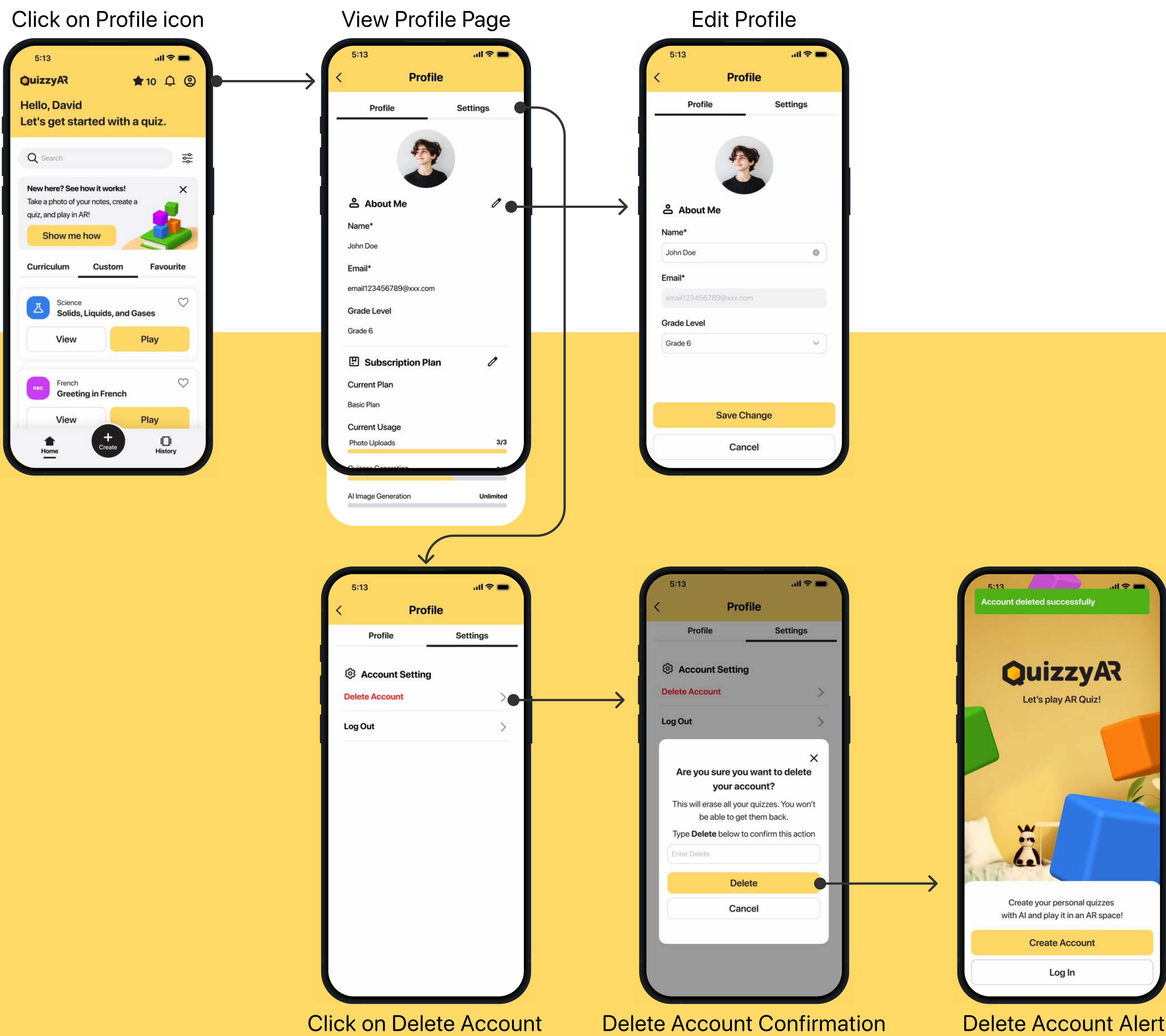


# Personal Profile

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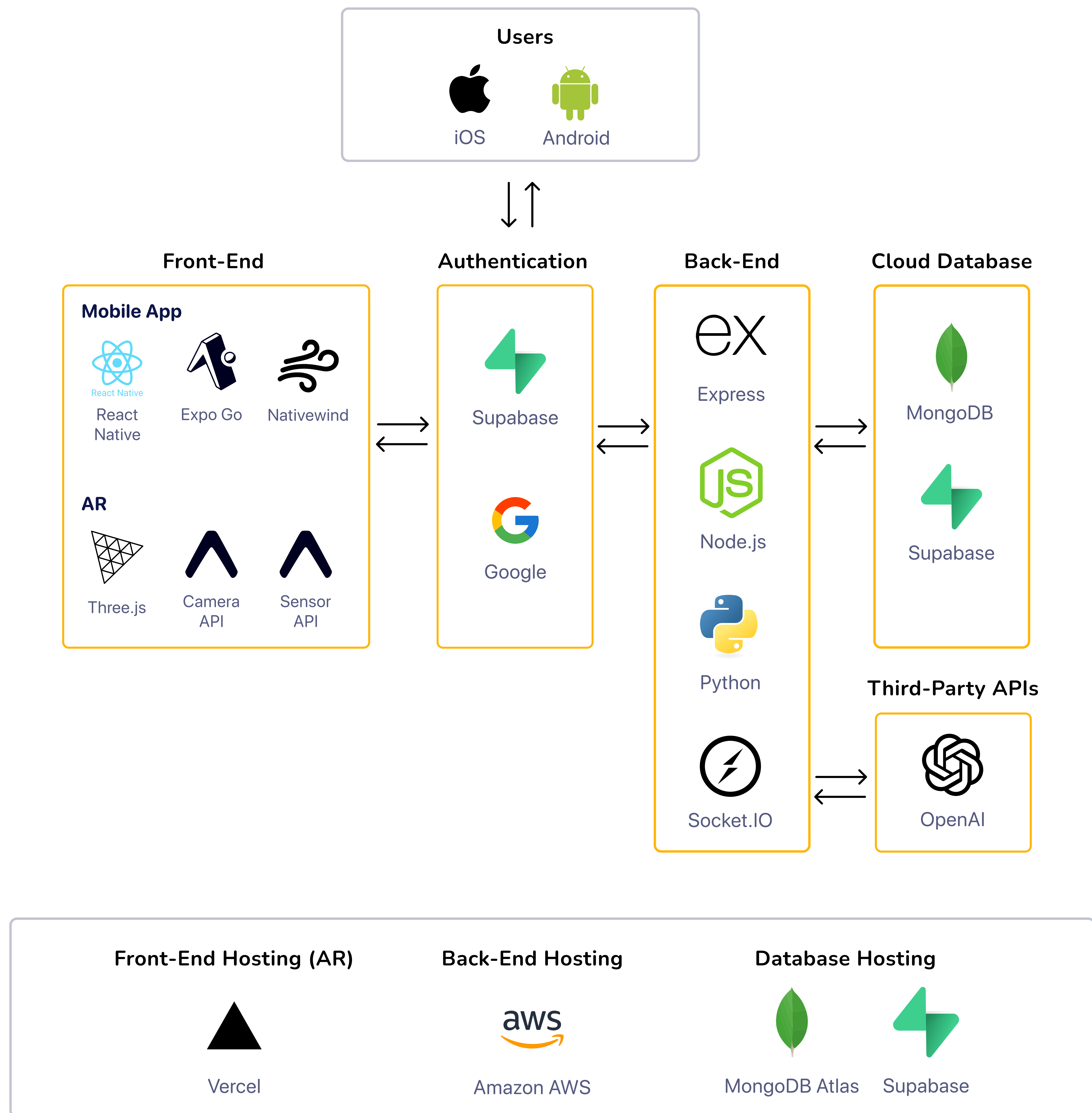


Full UX flow  
in Figma file





# System Architecture





## Frontend

We chose React Native and Expo Go for the frontend to efficiently develop a single mobile application that works seamlessly on both iOS and Android platforms. NativeWind is used to ensure consistent and rapid UI styling. With the integration of Three.js and Expo's Camera and Sensor APIs, our app delivers advanced AR features that significantly enhance the AR quiz experience, making it more engaging, interactive, and immersive for users.

## Auth

Supabase is integrated for authentication as it serves both as one of our databases and as a provider of reliable real-time authentication features within our architecture. Additionally, Google authentication is integrated as an OAuth solution, which ensures users benefit from a secure and widely recognized login method.

## Backend

The backend is built with Express and Node.js, providing a robust and scalable API server for the application. Real-time features such as notifications are supported using Socket.IO. Python scripts are executed from Node.js for image processing tasks like background removal and object detection, which are essential for question image generation.

## Database

We use MongoDB as our main database because its flexible, schema-less structure allows us to quickly adapt to changing requirements. Supabase's database is used for image storage, such as question and user avatar images, and these image URLs stored in Supabase are referenced within MongoDB documents.

## Third-Party APIs

OpenAI is integrated for generating quiz content and quiz images. The backend uses OpenAI's GPT-4o to create quiz questions based on user-provided images, and also utilizes DALL-E to generate images.

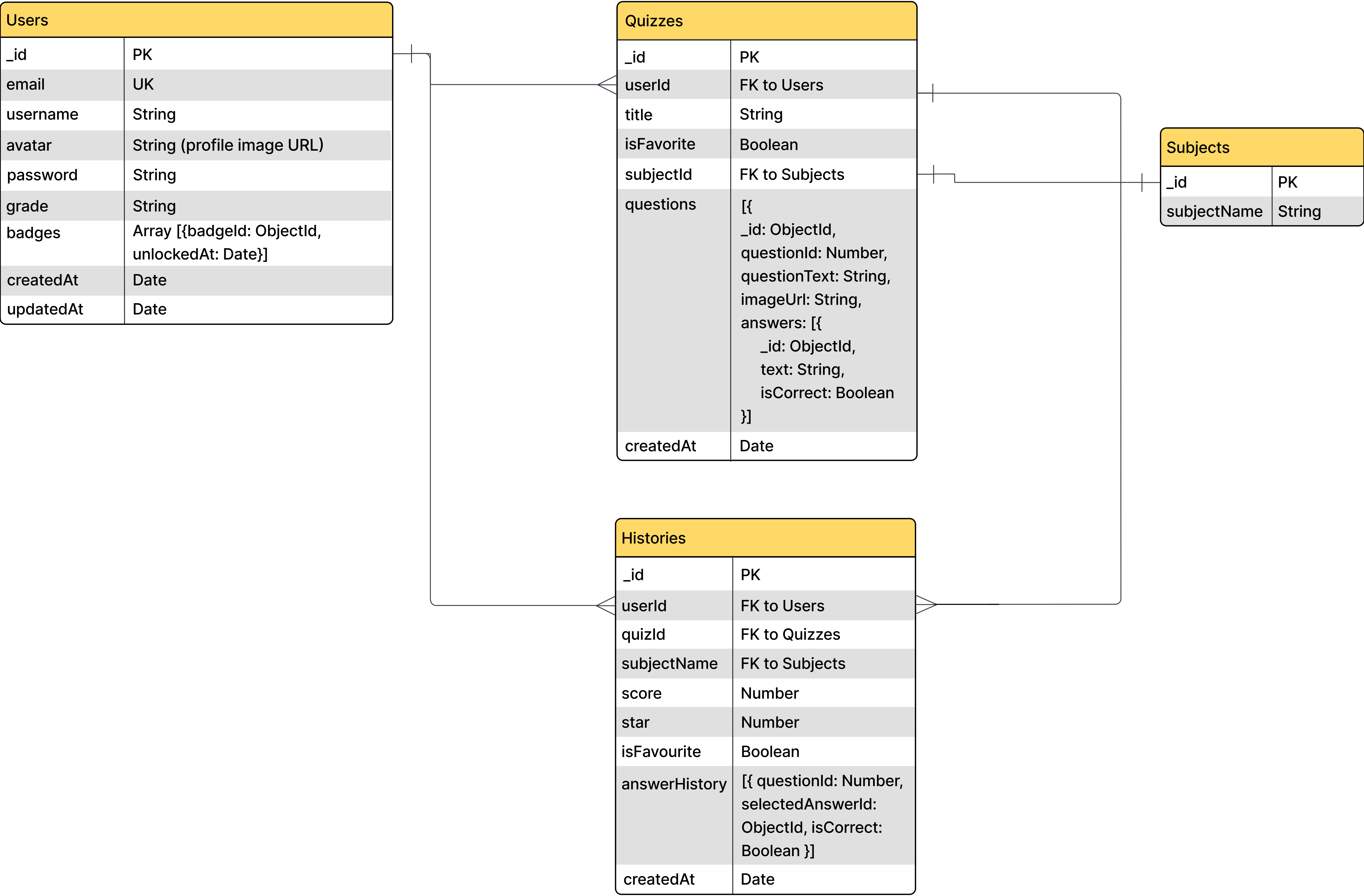
## Hosting

The frontend is a mobile application whose static assets are hosted on Vercel to ensure fast and reliable access within the app. The backend is deployed on AWS for scalability and robustness. Data storage is managed by services like MongoDB Atlas and Supabase, which make operations and maintenance straightforward.



# Data Model

The data model is designed to efficiently support the core features of the application, such as user management, quiz creation, quiz history tracking, and subject categorization.



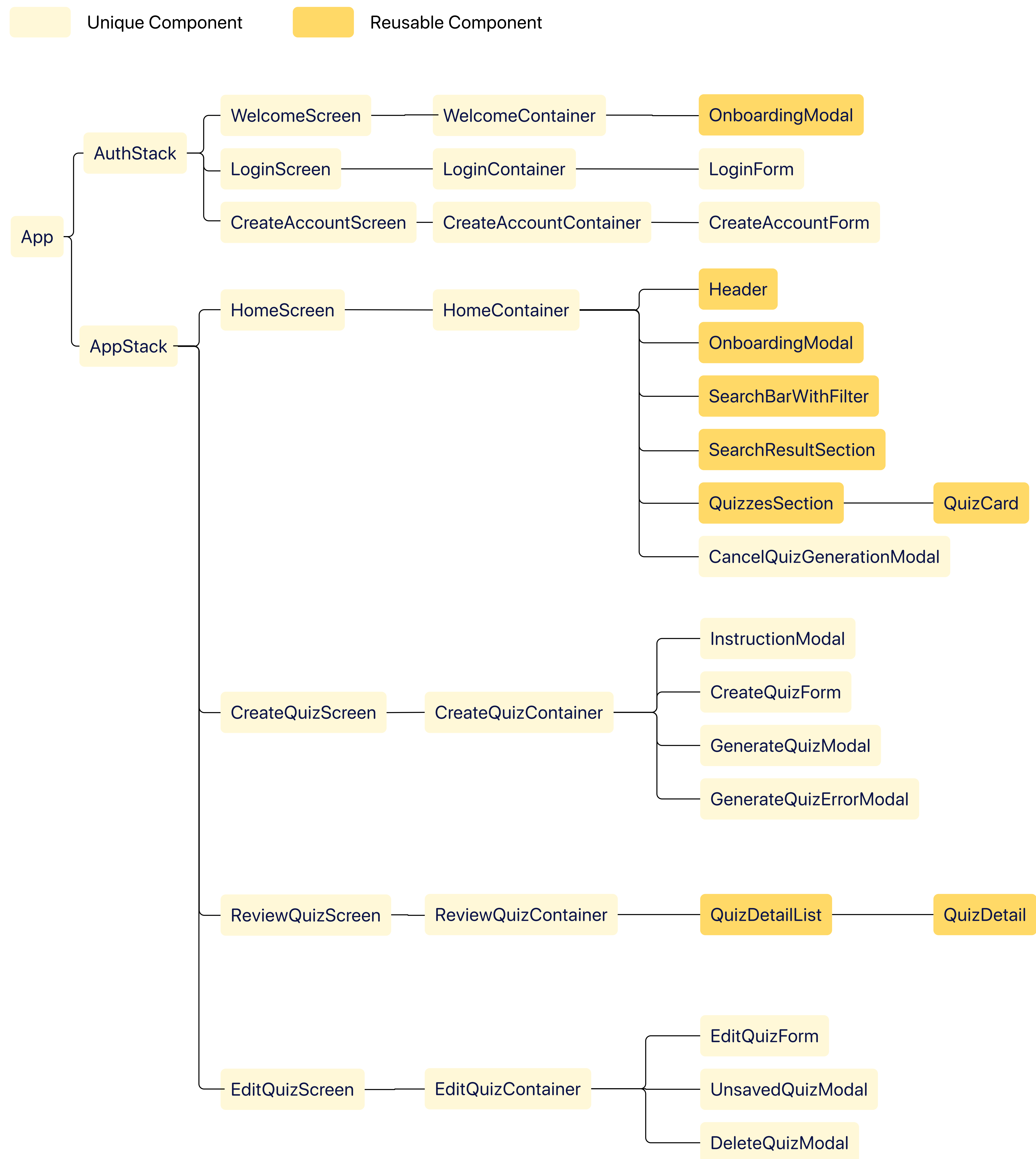


- The Users collection stores essential user information, including authentication data, profile details, and badges, enabling personalized experiences and progress tracking.
- The Quizzes collection is structured to allow flexible quiz creation, with each quiz linked to a user and a subject, and containing an array of questions and answers. This nested structure makes it easy to manage and retrieve all relevant quiz data in a single document, which is suited for MongoDB's document-oriented approach.
- The Histories collection records each user's quiz attempts, including their answers, scores. By linking histories to both users and quizzes, the model supports detailed progress tracking.
- The Subjects collection provides a way to categorize quizzes and histories, making it easy to filter and organize content by subject name.

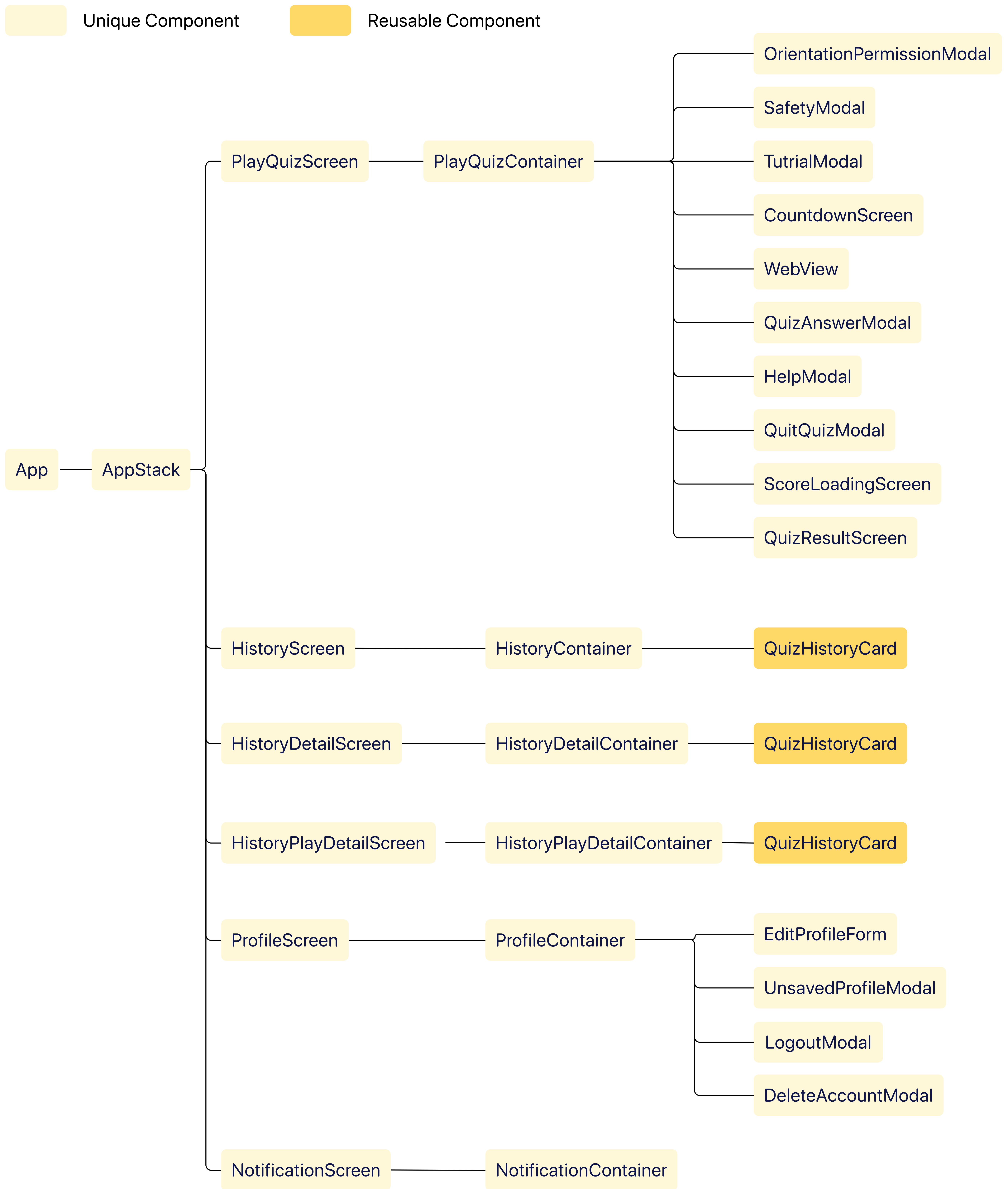
Overall, this data model leverages MongoDB's strengths in handling nested and flexible data structures, while maintaining clear relationships between users, quizzes, histories, and subjects. This approach ensures scalability, efficient data retrieval, and a seamless user experience as the application grows.



# React Components









# Tech Stack

## Project Management

Team uses Jira to manage and keep track of all the backlogs, use Slack for communication, use Google Drive to store and share all the materials within the project, use Google Doc keep track of the progress report.



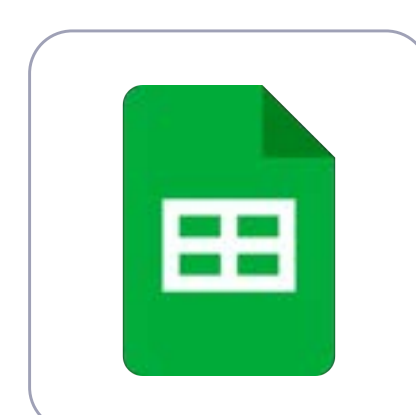
Jira



Slack



Google  
Drive



Google  
Sheet



Google  
Doc

## Design

Design team uses Figma to collaborate on UX/ UI tasks. Adobe Illustrator is mainly used for branding, marketing materials. Adobe Photoshop is used for editing images. Adobe Premiere Pro and After Effect are using for social media advertisement. Spline is used for create 3D Graphics. ZapWorks is used for AR prototype. Google documents are used for user research documentation.



Figma



Adobe  
Illustrator



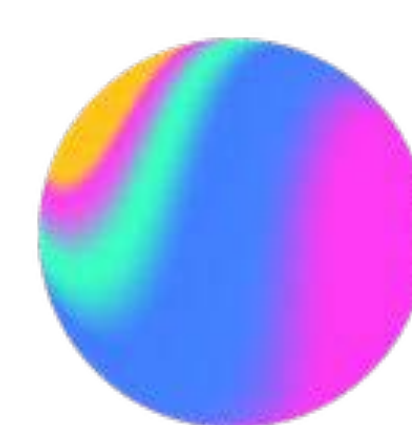
Adobe  
Photoshop



Adobe  
After Effect



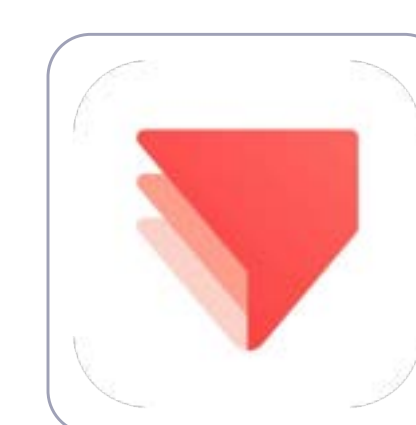
Adobe  
Premiere  
Pro



Spline



ZapWorks



ProtoPie



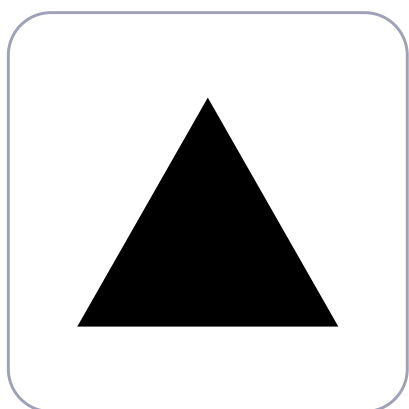
## Development

Development team uses React Native/Expo for cross-platform mobile development, featuring Three.js for 3D graphics and Expo Camera/Sensors for AR functionality. The backend uses Node.js/Express with integrated Python scripts for image processing via rembg. Data is stored in MongoDB with Mongoose, with Supabase managing authentication and storage. AI services include OpenAI GPT-4 for quiz generation and DALL-E 3 for image creation. The UI is styled with Nativewind. The application is deployed with Nginx as a reverse proxy for load balancing and SSL termination.

### Hosting Code & App



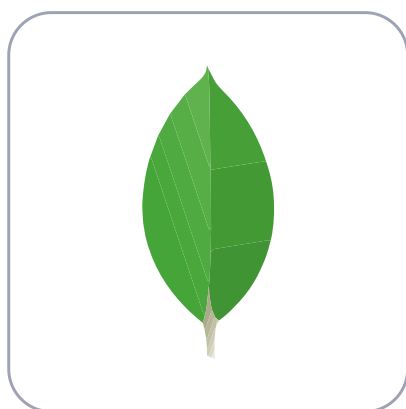
GitHub



Vercel

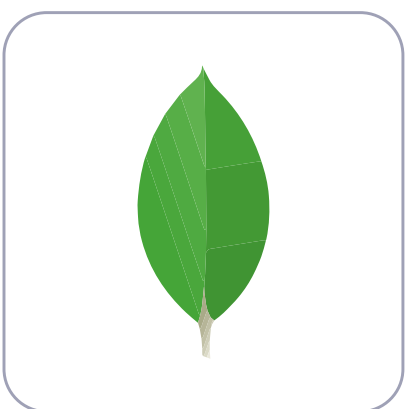


Amazon  
AWS

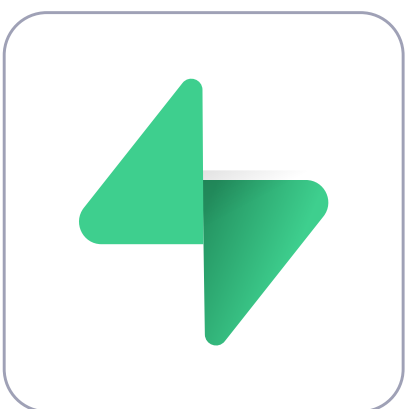


MongoDB  
Atlas

### Cloud Database



MongoDB



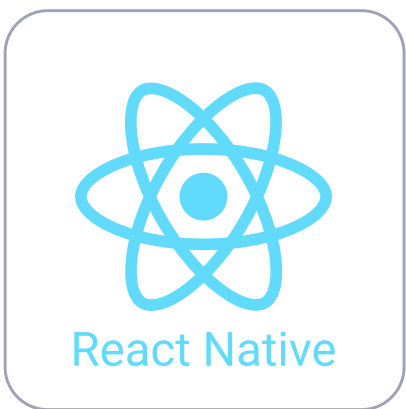
Supabase

### 3rd-party APIs



ChatGPT

### Frontend



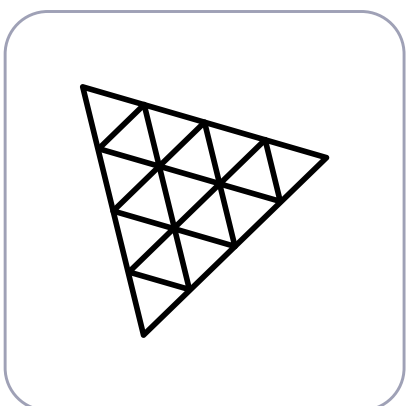
React  
Native



Expo Go



Nativewind



Three.js

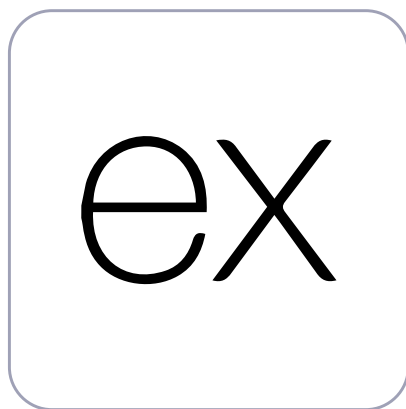


Camera  
API



Sensor  
API

### Backend



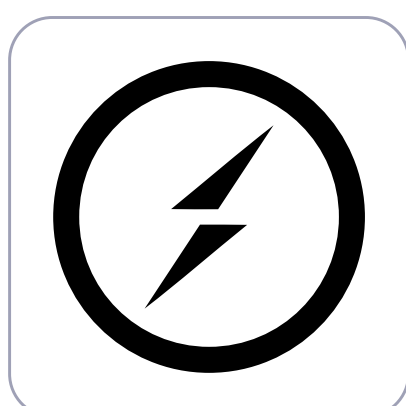
Express



Node.js



Python



Socket.IO

### Authentication



Google



Supabase



# Business Model

## Growth Strategy

We offer an enticing free trial to encourage new users: inviting a friend and get an extra quiz generation. This creates a simple yet effective growth loop, helping us expand through word-of-mouth while giving users more value early in their journey.

## Partnership / B2B Strategy

We aim to collaborate with curriculum publishers and educational content providers to embed lesson-aligned quiz templates directly into our platform. By syncing with school curricula, we can offer ready-to-use, high-relevance content for teachers and parents to enhance trust.

## Monetization Strategy

- The Starter Package includes basic functionality: limited uploads and quiz generation, with a monthly cap on AI image generation.
- The Basic Package (\$9.99) increases capacity and unlocks unlimited AI image generation.
- The Premium Package (\$19.99) removes limits entirely, allowing users to upload more quizzes and generate an unlimited number of quizzes and images.

### Starter Package

**\$0**/month

- Upload 1 photo/quiz
- Generate 2 quizzes/month
- AI Image generation 50 images/month

### Basic Package

**\$9.99**

- Upload 3 photo/quiz
- Generate 30 quizzes
- Unlimited AI Image generation

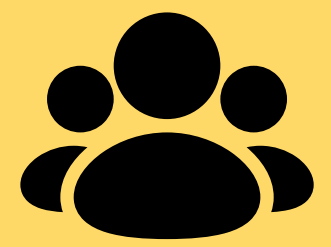
### Premium Package

**\$19.99**

- Upload 5 photo/quiz
- Generate 60 quizzes
- Unlimited AI Image generation

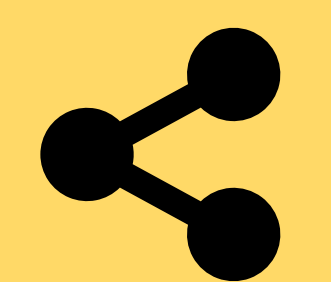


# Future Feature



## **Multiplayer AR Quiz**

The app will support multiplayer gameplay, allowing users to share quizzes and invite friends to join and play together in an interactive AR room. This feature aims to enhance engagement and collaborative learning.



## **Quiz Sharing**

Users will be able to share the quizzes they create with friends, allowing others to play the quiz individually. This feature encourages students to exchange and review learning materials collaboratively, without requiring multiplayer or group play.



## **Reward System**

Users will be able to redeem the stars they collect for rewards, additional quiz generation, or subscription credits. This feature helps keep users motivated by transforming their learning achievements into playful rewards.



# Our Team

## Design



### **Kuei Wen Cheng, Co-PM & Product Designer**

As a Co-PM, I coordinate between the design and development teams, manage client communications, and ensure smooth collaboration. Additionally, I contribute to UX/UI design and support the lead designer in achieving project goals.

 [katy-cheng-index](#)



### **Akihiro Yanagida, Co-PM & Product Designer**

Led project scheduling and facilitation while also contributing to UX strategy. Conducted user interviews, created user flows and wireframes, and designed a user-centered interface. Additionally, coded the landing page.

 [aki98](#)



### **Chih Hsin Fan, Lead Product Designer**

Actively involved throughout the entire design process from research to delivery. Establish clear design standards and principles to maintain consistent design quality in the team and ensure design decisions are made by user research and insights.

 [jessy-fan](#)



### **Apinporn Benjarurawong, Product Designer**

As UX/UI Designer, I apply my previous experience in IT consulting for system analysis and problem-solving to create user-centered design. Focusing on user research, wireframe, mock up and usability testing to design effective experiences for users.

 [apinporn-benjarurawong](#)



## Development



### **Yoshiki Katayama, Dev Lead & Full Stack Developer**

Developed RESTful APIs for backend services and database integration. Implemented frontend screens and designed reusable component libraries. Collaborated on full-stack development to deliver seamless user experiences. Contributed to project planning and technical decision-making processes.

 [yoshiki-katayama](#)  [yk4651](#)



### **Yuki Koyama, Full Stack Developer**

Implemented an immersive, interactive AR quiz feature using Three.js and WebXR, developing both the frontend and backend, and integrating with the database to deliver seamless real-time 3D experiences.

 [yuki-koyama](#)  [yukikpz](#)



### **Nodoka Hanaki, Full Stack Developer**

Developed an AI-powered quiz generation feature using the OpenAI API including frontend development, integrated dynamic image generation, and implemented image processing using Python to create personalized and engaging visual content.

 [nodoka-hanaki](#)  [nk21t5c7](#)



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<https://www.mdpi.com/2227-7102/13/9/864>



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Paul Brassard • Binazir Farokhi • Amandeep Singh • Reza Etemadi





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