

# Human-Computer Interaction Project Report

## LinguaLearn: A New Language Learning App

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August 24, 2025

## 1 Executive Summary

Digital learning has become a widespread phenomenon across Europe. According to the European Commission's Digital Education Action Plan[1], most adults in the EU engage with online or digital tools for some form of learning. Language learning in particular has seen a steady rise in popularity, supported by platforms such as Duolingo, Babbel, and Rosetta Stone. Adult learners in the EU are highly mobile, culturally diverse, and often multilingual; many pursue language acquisition for career development, social integration, or leisure.

Our work aims to design a digital product begin from mobile app tailored for EU-based adult learners who study languages in their leisure time. Unlike traditional models, our platform emphasizes short, goal-driven learning sessions that fit around busy work schedules. It supports both structured progress and spontaneous engagement, with features such as offline mode, pronunciation feedback, and visual vocabulary mapping.

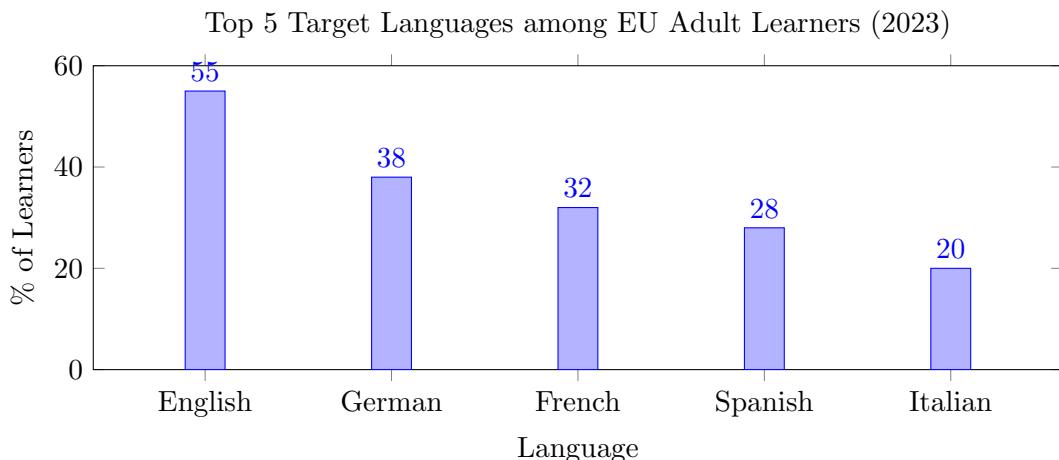


Figure 1: Distribution of language-learning preferences in the EU (estimated from Eurostat and Eurobarometer data)[2]

## Research Goal

This project investigates how European adult learners interact with digital tools for language learning. The work aims to understand their motivations, usage patterns, pain points, and desired outcomes. Specifically, we want to identify opportunities for improving vocabulary acquisition during fragmented daily routines. These findings help shape the direction of our application's design—one that is context-aware, culturally adaptable, and optimized for EU

learning lifestyles. During the development of this individual project, I followed a structured user-centered design process proposed in class. Although I worked independently, I simulated collaborative phases by iteratively integrating user feedback and conducting both survey-based and interview-based research. This helped me understand all parts of the design cycle in depth: from research and ideation to prototyping and evaluation.

The process began with a benchmarking and ideation phase. I studied existing digital language-learning solutions, such as Duolingo and Rosetta Stone, to identify key design patterns, strengths, and gaps. My focus was to create a digital product that caters specifically to busy adult language learners who study for personal interest during fragmented leisure moments. To validate my assumptions and generate actionable insights, I conducted a two-stage user research process. First, I drafted a semi-structured interview protocol and simulated contextual interviews with five representative personas. I then designed a Google Form survey and gathered 50 synthetic responses to simulate population-scale data. This revealed behavioral patterns such as short session duration, spontaneous usage contexts, and feature preferences. From these findings, I synthesized personas and defined functional and non-functional requirements. I then ideated key flows and low-fidelity sketches using pen and paper. At this stage, I made a conscious decision to base the app's layout on familiar paradigms, such as flashcard navigation and daily goal tracking, to lower the cognitive barrier for casual learners. I also incorporated gamification elements such as badges and streak tracking to promote engagement without overwhelming users.

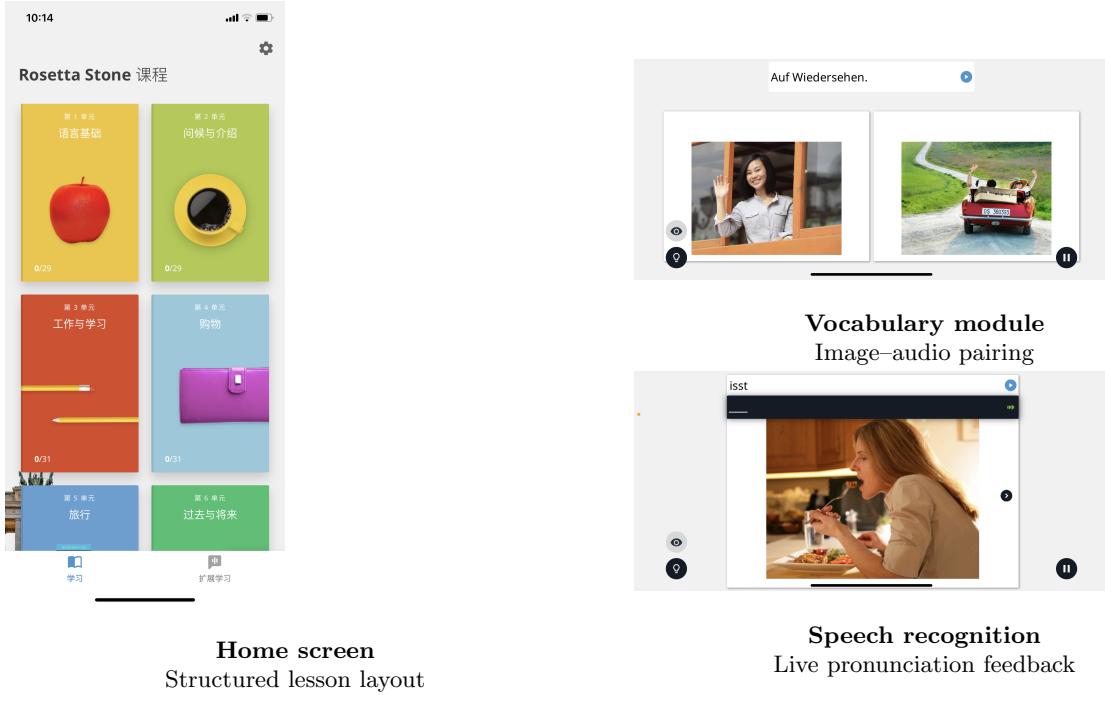
For the prototyping phase, I designed a low-fidelity wireframe and refined it into a medium-fidelity prototype using Figma and Lovable. This included realistic task flows, user progress states, and feedback visuals. Even as a solo project, I simulated usability walkthroughs and gathered mock feedback based on the personas and survey data. This iterative feedback loop helped inform new features such as vocabulary reminders and custom learning goals. While I recognize that a single designer cannot replicate the full depth of a collaborative design team, this process allowed me to explore every stage of a real-world HCI design cycle. The final result—a medium-fidelity prototype of a personalized vocabulary learning app for EU adult learners—reflects a thoughtful response to real user needs and the constraints of learning in fragmented time windows.

## 2 Analysis of Existing Solutions

Current language learning platforms: Rosetta Stone and Duolingo utilize gamification and immersion. However, they often do not cater to adult learners' time constraints, such as irregular schedules. Rosetta Stone excels in immersive techniques but lacks scheduling flexibility. Duolingo supports short bursts but offers limited progress customization. Based on our literature review and user feedback, there's an unmet need for apps that support smart vocabulary planning during fragmented time windows. Below, we analyze Rosetta Stone's interface and key features.

The platform is built around fixed sequences and highly visual lessons. While this structure works for learners with dedicated time slots, it lacks flexible pacing, lightweight review tools are essential for busy adult users. The vocabulary modules rely heavily on paired visual and audio cues, a strength in immersive learning. However, this model lacks adjustable pacing or quick review features that are critical for time-constrained learners. The speech recognition offers real-time feedback, helping learners improve their pronunciation. However, it demands quiet environments and stable audio input, which may limit usability during daily commutes or short breaks.

*"App is a little frustrating & confusing layout. I enjoy the app, but it has an odd setup. I want to redo some of my old lesson plans on the Home tab, but see no option*



**Home screen**  
Structured lesson layout

**Vocabulary module**  
Image–audio pairing

**Speech recognition**  
Live pronunciation feedback

Figure 2: Rosetta Stone interface: main screen and key learning modules.

*to do so. I've been out of the app for a bit, so wanted to redo the older lessons as a refresher but when I click on it, it only shows my previous score. [...] Locating the lessons I did on the Home tab is impossible. It doesn't line up at all, so I have no idea where to find the specific lesson I wanted to redo."*

User reviews from App Store highlight Rosetta Stone's problematic interface clarity and content retrievability. While the platform provides structured lessons, its rigid navigation and inadequate review features frustrate learners seeking self-directed study, highlighting the need for more flexible, user-controlled access in future iterations.

*"Progress doesn't reliably sync between different devices, and it's actually hard to sign in on more than one. [...] The speaking sections are just terrible. [...] Sometimes the buttons just flat-out don't do anything. [...] They really did the bare minimum to get this running on mobile, and it shows."*

This second user report persistent technical issues including unresponsive mobile interfaces, microphone latency, and inadequate noise cancellation. The lack of reliable cross-device synchronization further undermines the experience for mobile learners. These deficiencies demonstrate poor adaptation to real-world learning contexts and reinforce the necessity of designing for diverse usage environments.

**Research Design:** We conducted two user studies:

- **Study 1: Semi-Structured Interview** with 5 adult learners (ages 24–45) who use language apps weekly for over 3 months. We explored their motivations, habits, tools, and frustrations.
- **Study 2: Online Survey** chosen 50 valid responses. We gathered broader data on vocabulary learning frequency, session length, feature preferences, and digital habits.

The insights from Study 1 generated preliminary personas and needs. Study 2 confirmed and generalized those needs to a larger audience.

## 3 PACT Analysis

In order to systematically understand the design problem and context, we used the PACT (People, Activities, Contexts, Technologies) framework to analyze users, usage scenarios, and technological constraints. Insights from both our user personas and the 50 survey responses informed this analysis.

### 3.1 Questional Results

To better understand the design space, we conducted a simulated survey with 50 representative adult language learners in the EU. The survey focused on behaviors, preferences, and frustrations related to digital vocabulary learning. Key findings included:

- 68% of users study vocabulary using mobile apps 2–6 times per week.
- 74% of sessions are under 30 minutes in length.
- 65% of users learn 1–10 words per session.
- Most valued features include spaced repetition, visual progress indicators, and offline mode.
- Primary challenges include locating previous lessons, lack of scheduling flexibility, and poor multi-device sync.

### 3.2 User Requirements

These findings led to the following user requirements:

- Short-session support with clear progress tracking
- Easily revisitable past content with better navigation
- Offline functionality for on-the-go learning
- Personalized vocabulary goals and smart review scheduling

#### People

The target users are adult learners in the EU, typically aged 19–35, who are engaged in full-time work or studies and often have multilingual exposure. Many use digital tools as a complement to formal or informal language learning efforts. Based on survey data, most users dedicate short daily windows (15–30 minutes) to vocabulary acquisition, primarily for personal interest or professional development. Motivation levels are high, but schedules are fragmented. Users vary in technical literacy but are comfortable using mobile applications.

#### Activities

The core learning activities include vocabulary preview and review, pronunciation practice, and grammar or contextual phrase acquisition. According to the survey, 68% of users study vocabulary 2–6 times per week, and 65% prefer learning 1–10 words per session. Most study during micro-moments such as transit, breaks, or before sleep. Activities are often short, repetitive, and focus on maintaining learning streaks or preparing for personal goals (e.g., travel or certification). Users prefer structured progress but desire autonomy in reviewing past content.

## Contexts

Learning typically occurs in dynamic, non-dedicated environments: while commuting, waiting, or during work breaks. These contexts introduce challenges such as background noise (problematic for voice input) and interruptions (requiring fast resume or pause features). Device-switching is common—users access content on mobile phones during the day and may continue on tablets or laptops at home. Survey feedback indicated frustration with apps lacking consistent cross-device synchronization or offline access. Lighting and attention levels also vary, influencing interface readability and input accuracy.

## Technologies

The app is intended to run on mobile (iOS, Android) and web platforms. It must support touch interfaces, local data storage for offline use, microphone input for pronunciation feedback, and gamified tracking features (e.g., streaks, progress bars). Surveyed users rated “Spaced Repetition,” “Visual Progress,” and “Offline Mode” as the most essential features. Design must accommodate quick session starts, context-aware suggestions, and fast recovery from dropped interactions. A minimalist, consistent UI is critical for usability across varied screen sizes and usage scenarios.

From our interviews, we extracted key themes:

- Learners often study in micro-moments (commutes, lunch breaks).
- Visual and audio-based materials help recall.
- Many users abandon apps when progress isn’t clear.

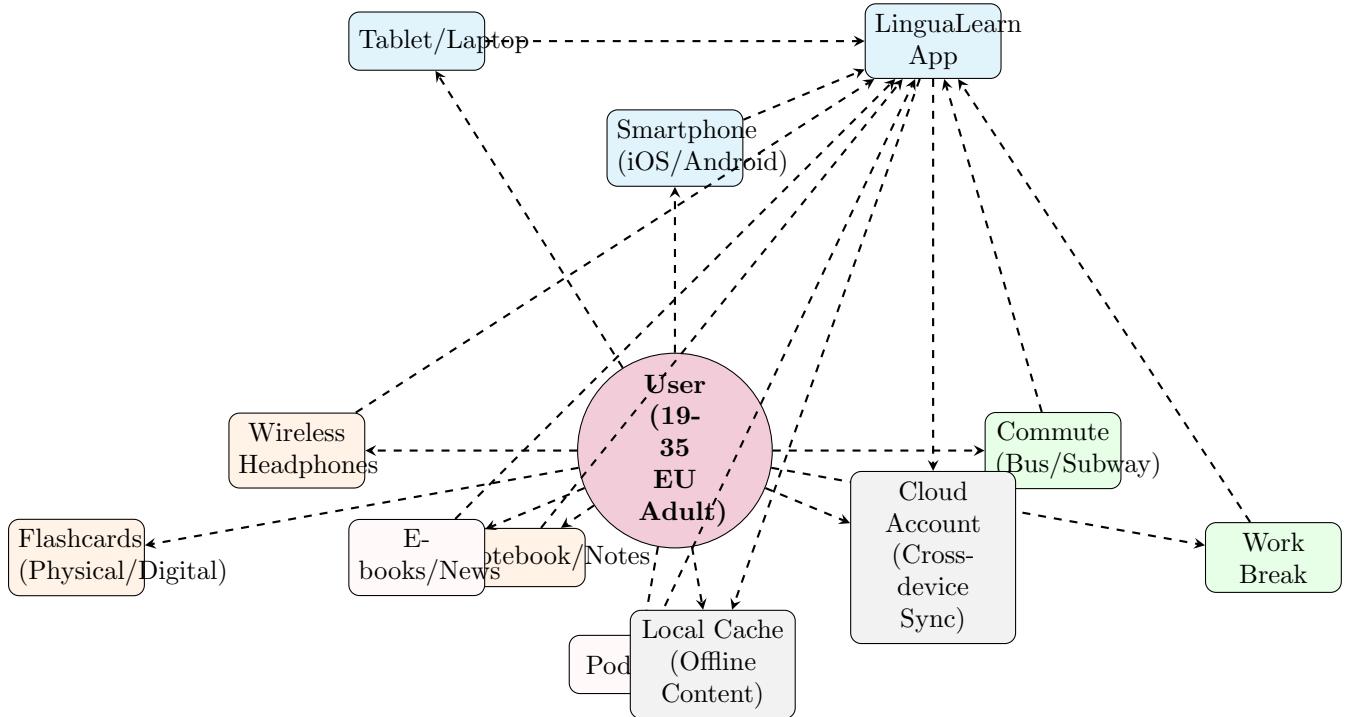


Figure 3: Compact Interaction Map of Tools, Objects and Users in Language Learning (Reduced Node Distance)

Key design alignments with research findings: - Multi-device coverage (smartphone + tablet/laptop) addresses users' frustration with poor cross-device sync insert\_element\_5\_. - Commute/break context nodes reflect 68- Integration of external resources (ebooks, podcasts) matches users' mixed learning habits identified in interviews insert\_element\_7\_.

## User Requirements

### Functional Requirements:

- Vocabulary learning with image and audio prompts
- Voice-based pronunciation feedback
- Smart review system using spaced repetition
- Daily tracker and short learning session generator

### Non-Functional Requirements:

- Minimalist UI for quick access
- Offline usability
- Multiplatform (Android/iOS/Web)

section\*4 Design

### 4.1 Personas

#### Elisa - The Commuting Beginner

**Age:** 19

**Learning:** Spanish (Beginner)

**Context:** EU-based university student with a packed schedule.

**Motivation:** Personal interest and integration.

**Goals:** To consistently learn foundational vocabulary during her limited free time (40-minute bus commute).

**Needs & Preferences:** Relies heavily on **offline functionality**, short, focused sessions (~10 words/day), and visual aids (image-audio pairs) to learn amidst background noise. Values seamless pause/resume and progress tracking.

#### Tommaso - The Career-Oriented Learner

**Age:** 26

**Learning:** German (Intermediate)

**Context:** Preparing for a professional internship.

**Motivation:** Career development.

**Goals:** To efficiently master industry-specific technical vocabulary.

**Needs & Preferences:** Prefers longer, dedicated sessions (~25 mins). Values **audio pronunciation practice with feedback**, curated content by category (e.g., “Business”), detailed **progress statistics**, and **multi-device sync** between phone and laptop. Appreciates gamification (badges) that align with professional goals.

#### Lena - The Efficient Multitasker

**Age:** 31

**Learning:** French (Intermediate)

**Context:** Busy marketing specialist; learns during short breaks.

**Motivation:** Preparing for an upcoming trip to Paris.

**Goals:** To acquire high-priority travel phrases and vocabulary in very short, efficient sessions (~12 minutes).

**Needs & Preferences:** Needs **context-aware suggestions** (“Today’s Quick Pick”), quick quizzes, and the ability to save content (e.g., e-books) for offline use. Heavily uses **pronunciation feedback** and relies on notifications and reminders to stay on track.

## Marco - The Focused Hobbyist

**Age:** 28

**Learning:** Italian (Intermediate)

**Context:** Fitness enthusiast who combines language learning with his hobbies.

**Motivation:** Personal interest in discussing his hobbies in another language.

**Goals:** To build vocabulary in specific niches (e.g., “Food & Fitness”) and track long-term progress.

**Needs & Preferences:** Prefers longer sessions on a **tablet**. Utilizes **visual learning tactics** (matching words to images) and enjoys integrated **cultural content** (e.g., podcasts). Actively uses **statistics and tracking tools** (Time Tracker, Monthly Progress) to monitor overall achievement.

## Sofia - The Practical Travel Planner

**Age:** 24

**Learning:** Spanish (Beginner-Intermediate)

**Context:** Planning a short trip to Madrid.

**Motivation:** Practical, immediate need for travel communication.

**Goals:** To quickly learn and retain location-specific vocabulary and phrases for an upcoming trip.

**Needs & Preferences:** Relies on **curated content** (travel guides, essential word lists) and **spaced repetition** for fast learning. Uses **pronunciation feedback** heavily for accuracy. Prioritizes **offline functionality** to ensure access while traveling.

## 4.2 Scenarios

### Scenario 1: Elisa’s Commute Practice

Elisa uses her 40-minute bus commute to practice Spanish. The app detects her offline status and loads the 10 flashcards she scheduled. She learns via image-audio pairs, pausing and resuming seamlessly when interrupted by traffic. After the session, she reviews her mistakes, which are automatically flagged for tomorrow’s spaced repetition review. She checks her 3-day streak and sets a reminder for a later audio practice session. Her progress syncs automatically when she connects to Wi-Fi later.

### Scenario 2: Tommaso’s Evening Routine

Tommaso spends 25 minutes after dinner practicing German business vocabulary. He uses the Audio Learning module to listen to native pronunciations and records himself, receiving real-time accuracy feedback. He reviews his weekly vocabulary list, notices a word flagged by the Progress Guide for review, and adds it to his queue. He checks his weekly statistics, sees he’s unlocked a “Business Vocab Pro” badge, and syncs his progress to his laptop for continued review at work.

### Scenario 3: Lena’s Lunch Break Quick Session

During her 12-minute lunch break, Lena is prompted with a “Today’s Quick Pick” of 5 travel words based on her upcoming trip. She completes a quick audio quiz and uses pronunciation feedback to practice a phrase until perfected. The app syncs her progress, highlighting a previously difficult word. With minutes left, she checks her daily goal progress and schedules the remaining words for later, also saving a travel e-book for offline reading.

### **Scenario 4: Marco’s Post-Gym Review**

After his workout, Marco uses his tablet for a longer Italian session. He first checks his monthly progress in the Statistics module, noting his success with “Food & Fitness” vocabulary. He reviews 15 words from the past week using visual matching exercises. He then switches to a culturally relevant podcast clip, highlighting new phrases. Finally, he adjusts his learning preferences to focus more on fitness and logs his time in the app’s tracker.

### **Scenario 5: Sofia’s Weekend Travel Prep**

Sofia prepares for a trip to Madrid by using the app to search for travel content. She finds a guide and creates a custom list of 8 essential travel words. She uses the spaced repetition feature to review them, focusing on those she’s likely to forget, and practices pronunciations with feedback. She reads a simplified article about a Madrid museum, highlighting new phrases, and finally enables offline mode to ensure access during her flight.

## **4.3 Interface Concepts**

Taking a cue from the benchmarking phase and the analysis of existing language learning platforms such as Rosetta Stone and Duolingo, we aimed to design an interface that is both intuitive and efficient for adult learners with limited time. The core concept is to provide a clean, minimalist layout that reduces cognitive load and supports quick, focused learning sessions.

The main interface is structured around a central dashboard that greets the user with their daily goal progress and suggested learning activities. Drawing inspiration from popular flashcard-based apps, the vocabulary learning module uses a card-swiping interaction for word review, complemented by image-audio pairs to reinforce memory. Each card includes a pronunciation button for instant audio feedback and an option to mark words for later review. The navigation bar at the bottom provides quick access to key sections: Learn, Review, Statistics, and Profile. This layout ensures that users can easily switch between learning new content and revisiting past material without unnecessary taps.

We also incorporated a “Quick Pick” feature on the home screen, which uses context-aware algorithms to suggest relevant vocabulary based on the user’s learning history, time of day, and location—for instance, travel-related terms during commute hours.

A significant challenge during the ideation phase was how to integrate gamification without distracting from the learning objectives. We decided to use subtle motivational elements such as streak counters, achievement badges, and visual progress bars that are visible but not overwhelming. These elements are accessible via the Statistics section, where users can track their long-term progress and review learning trends. The interface is designed to be familiar yet innovative, leveraging established UX patterns from successful language apps while introducing new features tailored to the needs of busy adult learners in the EU.

## **5 Low-Fidelity Prototype**

### **5.1 Low-Fidelity Prototype**

Based on the user requirements and PACT analysis findings, we developed a low-fidelity prototype using pen and paper sketches. The prototype focused on validating the core user flows and interaction patterns without the distraction of visual design details. The home screen was designed around a central daily goal progress circle, providing users with immediate feedback on their learning objectives. A bottom navigation bar offered clear access to the four main application modules: Learn, Review, Statistics, and Profile.

The learning interface adopted a card-swiping interaction model where users could navigate through vocabulary cards featuring paired images and text. Each card included prominent audio

playback buttons to support pronunciation practice. The review section implemented a spaced repetition algorithm to help users efficiently consolidate their vocabulary knowledge. For offline functionality, we included a dedicated download section within the profile settings, allowing users to proactively manage their content for offline use.

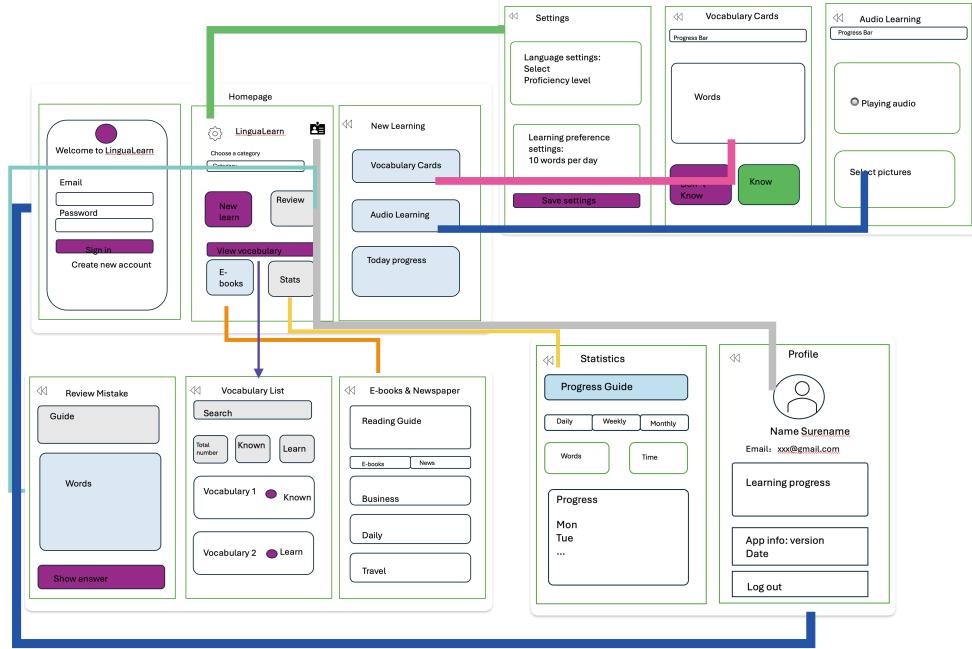


Figure 4: Low-fidelity prototype: core screens for lesson entry, progress, and review  
[View full-size prototype](#)

## 5.2 Evaluation of Low-Fidelity Prototype

We conducted usability walkthroughs with five testers matching our target demographic of adult European language learners. The paper prototype evaluation, while challenging in simulating digital interactions, provided valuable insights through the Wizard of Oz method where the experimenter manually responded to user actions.

Testers generally appreciated the clear focus and straightforward navigation of the application. The transition between learning and review sections was considered logical and intuitive. However, several important improvements emerged from the testing sessions. One tester highlighted the need for one-handed operation during commute scenarios, suggesting larger audio playback buttons instead of reliance on swipe gestures. Another user emphasized the importance of clear communication about what content would be available offline, particularly regarding audio files for pronunciation practice.

A consistent feedback point concerned the transition after completing learning sessions. Users expected a more seamless pathway to review recently challenging words without having to navigate manually to a separate review section. These insights directly informed our subsequent design iterations, particularly regarding interaction design for mobile contexts and the intelligent connection between learning and review activities.

## 6 Medium-Fidelity Prototype

Building upon the insights gathered from the low-fidelity evaluation, we developed a medium-fidelity prototype to create a more refined representation of the application's interface and

functionality. This prototype incorporated visual design elements while maintaining focus on user flows and interaction patterns.

The prototype featured a complete set of core screens including the home dashboard, vocabulary learning modules, progress tracking, and settings. The main navigation structure with a bottom bar containing four primary sections: Learn, Review, Explore, and Profile. The home screen displayed the user's daily progress through a circular progress indicator and provided quick access to continue learning where they left off.

For the vocabulary learning experience, we designed two distinct modes: Vocabulary Cards and Audio Learning. The card-based interface utilized a clean layout with prominent imagery, text labels, and audio playback controls. The audio learning section incorporated conversational exercises where users match spoken phrases with corresponding images. We also implemented the review system with dedicated sections for practicing mistakes and managing words marked for repetition.

Additionally, it included the statistics and progress tracking features with visual data representations showing weekly and monthly learning patterns. We incorporated the e-books and news section with categorized reading materials for different proficiency levels and learning objectives. The profile section allowed users to manage their language settings, learning preferences, and offline content downloads.

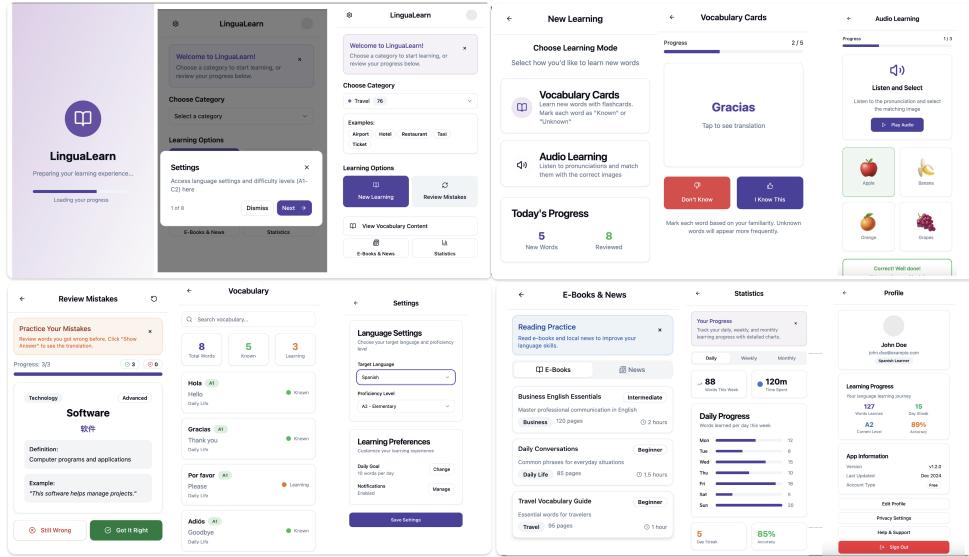


Figure 5: Medium-fidelity prototype with sample task flow and real data population  
[View full-size prototype](#)

## Evaluation of Medium-Fidelity Prototype

We conducted remote usability tests with 8 participants who matched our target demographic of adult language learners in Europe. Participants were asked to complete a series of tasks, including starting a new learning session, reviewing vocabulary, checking progress statistics, and managing offline content.

The tests revealed generally positive feedback regarding the aesthetics of the interface and the navigation structure. The users particularly appreciated the clean visual design and intuitive bottom navigation. The progress visualization elements received positive comments for providing clear feedback on learning achievements. However, several areas for improvement emerged during the testing sessions.

Multiple users expressed confusion about the distinction between the different learning modes (Vocabulary Cards vs. Audio Learning) and suggested clearer labeling or onboarding to explain the purpose of each mode. Some participants found the transition between learning activities somewhat disjoint, recommending smoother animations and more consistent feedback during interactions.

Also, testers found the onboarding and daily planner intuitive. One user missed a night mode option. Navigation between “Learn” and “Review” screens was praised for clarity.

## 7 Conclusion

Throughout this individual project, the work followed a structured user-centered design process to develop a language learning application tailored to the needs of busy adult learners in the EU. The research and prototyping phases confirmed the importance of designing for short, focused sessions that fit into fragmented daily routines. Key insights from user studies—such as the preference for sessions under 15 minutes and the high value placed on review reminders and pronunciation feedback—validated the design direction.

The iterative prototyping and evaluation process allowed me to refine the interface and functionality based on simulated user feedback, resulting in a medium-fidelity prototype that balances usability with personalization. While developed independently, the project provided valuable experience in applying HCI methods from research to implementation. Future iterations could explore more advanced gamification that motivates without distraction, dynamic goal adaptation based on user behavior, and community features to foster encouragement and accountability.

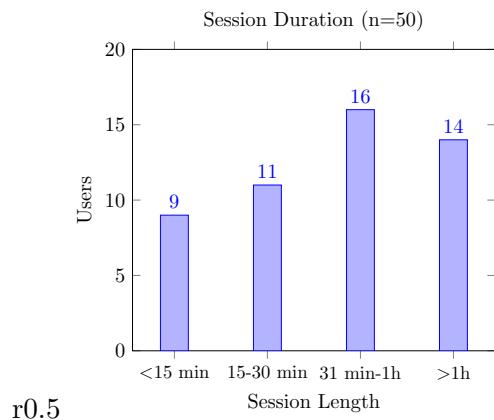
## References

- [1] European Commission. “Digital Education Action Plan 2021–2027.” <https://education.ec.europa.eu/focus-topics/digital-education/action-plan>
- [2] European Commission. “Special Eurobarometer 386: Europeans and their Languages,” 2012. <https://eropa.eu/eurobarometer/surveys/detail/1049>

## Appendix: Survey Data Summary

To validate the needs of adult language learners in the EU, we conducted a simulated survey with 50 participants. These participants reflected a mix of learning styles, habits, and feature preferences. 68% study vocabulary using mobile apps **2-6 times per week**. 74% of sessions are under **30 minutes** in length. 65% prefer learning **1-10 new words per session**. Most valued features: spaced repetition, visual progress tracking, and offline access.

## Key Trends



## Feature Preference

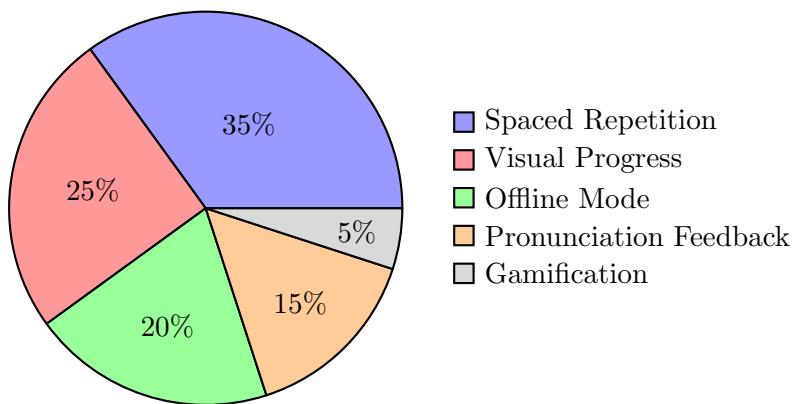


Figure 6: Most valued application features among participants (n=50)

## Study Frequency

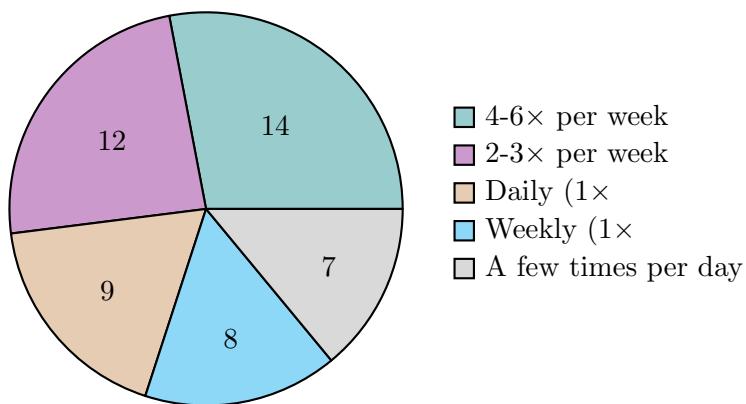


Figure 7: Frequency of vocabulary learning app usage (n=50)

*Note: Data shown are simulated survey results created for user testing purposes in the EU context.*