Hello, A/文 World!

Andrica Le N10893989 | Talia Yeo N11915595
Izziea Chen N11829923 | Penelope Li N12229300

PROJECT DESCRIPTION

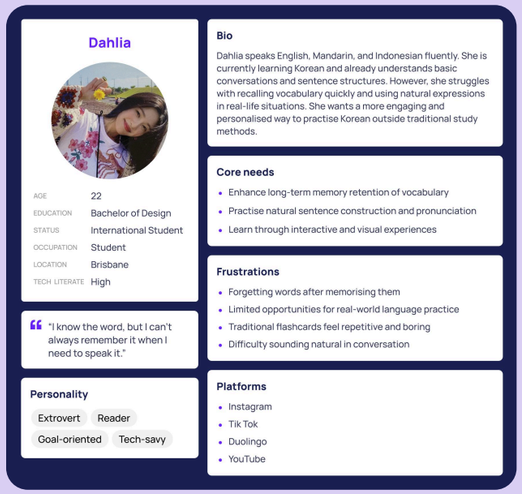
Hello World! We all know how hard it is to remember vocabularies when learning a new language. Especially for intermediate speakers who understand the fundamental rules and grammar, the important missing pieces for them to achieve next level fluency are usually the words and phrases they sometimes fall to recall when forming sentences.

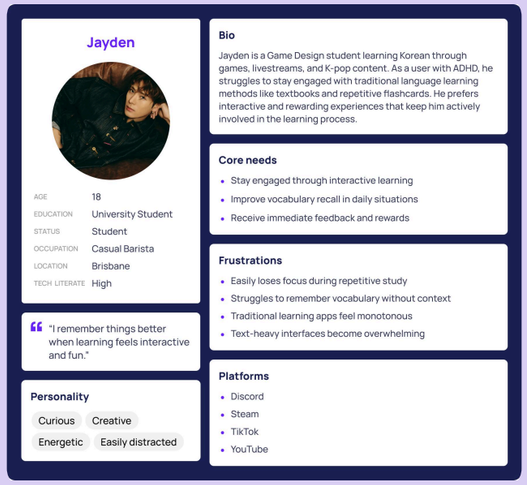
This frustrating forgetting curve as explored by Hermann Ebbinghaus (1885, as cited in Spiro, 2026.) is, even though inevitable, according to research, can be overcome by spaced repetitive practices.

Hello World is an **mobile-assisted language learning (MALL)** application designed to **facilitate** and **transform** this recalling process that everyone experience by **combining AR object capture function** to the idea of flashcards as the main learning approach. This enables the concept of semantic inferencing(Grenfell, M., & Harris, V.， 1998), as we alter the default flow that people enter when prompted to remember how an object is called in a foreign language. From using the AR flashcards to **leverage the learning opportunities** users encounter in day-to-day scenario, to the mechanism embedded to **encourage repetition** and **review progression**; Hello World serves as a **simple** and **intuitive** tool that **streamline** the most ordinary way of language acquisition.

USER DEMOGRAPHIC & PERSONA

- Age 18–25, university students or young working adults
- Intermediate to advanced learners of a target language
- High tech fluency; comfortable adopting new digital tools and interfaces
- Culturally engaged with digital content
- Fragmented, opportunistic study habits, learning happens in short bursts between other activities
- Tend to have difficulty maintaining focus and motivation over extended sessions





OUTSIDE OF SCOPE

We created this app for people with **intermediate understanding of a language** and already have **basic communication skills** and **basis of the language**, and the app helps **promote language recalling**. With **limited opportunities** to practice the language but not wanting to forget it, the users can use our app to **practice** and **brush up their vocabulary** and **linguistics**. Our design fundamentally builds on **user's interaction with the physical world**. The limit of only collecting words from scanning real-world objects is an **intentional** design to **increase the frequency** of this specific interaction, in oppose to allowing vocabulary import into the library, which **reduces** the interaction of the app.

EXPLORATION QUESTIONS

- What theories of language acquisition underpin the design of the AR language-learning app, and how do these theories support vocabulary retention and active recall?
- How do existing Mobile-Assisted Language Learning (MALL) applications currently approach vocabulary learning, and how can our app differentiate itself while learning from their strengths and limitations?
- What design strategies and engagement mechanisms can encourage consistent language practice without creating pressure or demotivation for users?
- How can the app support a user's journey from first-time onboarding to becoming a long-term, active learner on the platform?
- How effective can vocabulary practice remain for new users before they have built a substantial personal library of scanned objects?

DESIGN CONCEPT

CONTEXTUAL RESEARCH

Context-Based Learning and Semantic Inferencing

The core interaction of Hello World is to use AR to **capture real-world objects** and is deeply grounded in semantic inferencing. Research shows that advanced language learners **rely heavily** on world knowledge and physical context to **infer** and **anchor** the meaning of unfamiliar words (Grenfell & Harris, 1998). Rather than presenting decontextualised lists, Hello World naturally **activates this inferencing process** within the user's physical environment. AR signifiers overlaid on these objects **scaffold the experience** by **visually displaying familiarity levels**, transforming everyday surroundings into an active, contextual vocabulary landscape.

Repetitive Practice over Personal Context

Beyond mere capture, building a library of user-photographed items serves a **deep cognitive purpose**. Linking vocabulary to personal memories like a favourite coffee mug or a local cafe sign creates **rich, multimodal retrieval pathways**. Memory science confirms that information encoded with **meaningful personal associations** is **retained far longer** than words learned in isolation (Paivio et al., 1988; Stein & Meredith, 1993, as cited in You, 2026). This photo-based library **transforms abstract entries** into a personal visual archive anchored in real-world experience. By allowing users to select their saved objects for personalised, system-curated testing, the platform **actively fosters learner autonomy** and **self-directed study**.

Enhancing Memory through Multimodal Design

Hello World leverages **dual coding theory** by **simultaneously integrating visual, textual, and auditory elements**. The flashcard widget pairs a user-captured image with translation, spelling, and audio pronunciation, **activating both verbal** and **non-verbal encoding pathways** to **deepen memory retention** (Paivio et al., 1988, as cited in You, 2026). This multimodal integration **triggers sensory integration** in the brain, significantly improving **memory accuracy** and **storage efficiency** (Stein & Meredith, 1993, as cited in You, 2026).

Interactive Elements, Gamification, and Signifier Design

Interactive tasks can boost participation by 37 seconds and task completion to 92% (You, 2026). Hello World **embeds active behavioural interactions** across its core loop via AR capture, drag-and-drop tests, and voice recognition. Long-term motivation is sustained through a gamified token economy, daily tasks, and a gacha system for custom rewards. Crucially, the AR signifier system **bridges function and motivation**: its five familiarity states guide spaced-repetition, while customisable aesthetics **drive user ownership and progression**.

OUTSIDE OF SCOPE

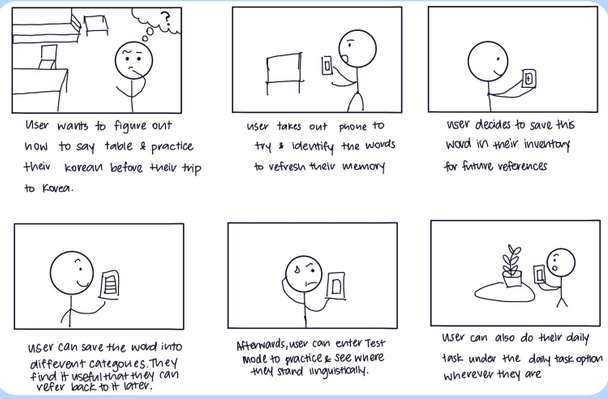
A systematic review of Duolingo literature from 2012 to 2020 identifies several strengths and persistent issues in gamified MALL that directly informed our design decisions (Shortt et al., 2023)

- Gamified elements such as streaks, badges, and leaderboards initially boost motivation, but the novelty effect wears off over time, and engagement declines when content feels repetitive
- Duolingo's activities are predominantly receptive (listening, reading) and translation-based, with limited support for productive skills like speaking and writing
- Users reported difficulty connecting their in-app progress to real-life language use
- Low sustained engagement remains a persistent issue across MALL platforms, even when apps are assigned as coursework (He & Loewen, 2022)

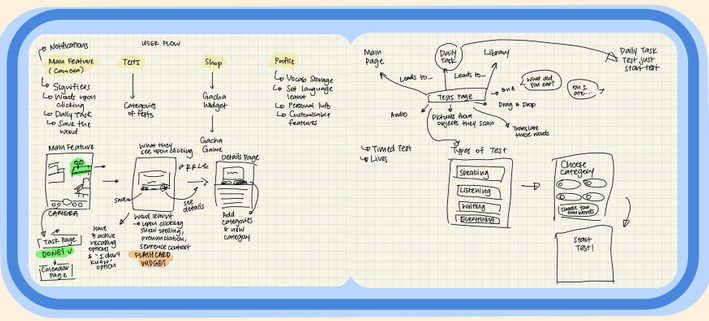
DESIGN PROCESS

TECHNICAL PRACTICE

The feasibility of this project is examined by exploring technologies such as Computer Vision (CV) and Semantic Visual SLAM (vSLAM), which can extract high-level semantic information for smooth object detection (Viso Suite, 2024; Chen et al., 2025). Specifically, the integration of a more lightweight models, such as YOLOv4-tiny or SSD, could be preferable as it enables real-time recognition of complex household objects on mobile devices by balancing detection accuracy with limited computational resources (Mathur & Gupta, 2024; Nafea et al., 2022). This advanced mapping allows the application to recognise environmental geometry and categorise items, transforming the physical realm into a stable, world-anchored digital learning layer (Bashneen, 2026)



USER FLOW





FINAL PROTOTYPE

AR FLASHCARDS
Interactive Learning

PHOTO-BASED LIBRARY
Interactive Learning

PERSONALISED TEST
Test your own abilities

CUSTOMISABLE SIGNIFIERS
Shop with the Gacha

INSTRUCTIONS

1. Open AR page and menu directory
2. Click on an AR object and type in object name in language. If they click 'I don't know', it opens the details / information page about the word
3. Like the captured image, and tap the '+' icon to save it to gallery in the details page before returning to the previous screen
4. Type / Speak the name of the object
5. Continue 3 flashcard questions about the object before it closes and returns to home screen
6. Go to daily test under the 'Test' option and complete questions
7. Check definition of words they do not know by clicking the words and complete the test before the time runs out
8. Go to Daily Task to get tokens
9. Go to shop to roll for a new UI accessory
10. Go to profile and choose customisation screen
11. Click one of the AR indicators to replace and choose a new accessory from the selection screen
12. Go to Library to read more on words that you are unsure of
13. Click the heart on the image they saved to make it to representative image
14. Go to test screen to practice and select relevant test to partake in
15. choose words and categories to practice and start the test
16. Complete test and close app

LINK TO VIDEO

LINK TO PROTOTYPE

USER EVALUATION

OUR EVALUATION METHOD

To validate our design decisions, we conducted a user evaluation by observing how participants interacted with the prototype in realistic usage conditions. Drawing from the Delft Design Guide (van Boeijen et al., 2014), the evaluation focused on three areas of user engagement: Perception (What users notice), Cognition (How they Interpret interactions), and Goal Completion (Whether the app supports their intended tasks).

The evaluation was guided by the following open-ended questions:

- How did you feel while navigating the app? Was there anything that disrupted the flow?
- What are some scenarios where you could imagine yourself using the app?
- How relevant do you think the app is to your language learning?

These questions were chosen to assess the usability, understand how the app can naturally integrate into their everyday routines and evaluate whether the users found the learning experience meaningful and relevant.

LIMITATIONS OF EVALUATION

The user was only able to interact with the prototype for a short period of time. The impact was that the feedback might not be able to fully reflect the long-term retention effectiveness, habit formation and sustained engagement overtime. Since language acquisition develops gradually through repeated exposure and recall, longer-term testing would provide more accurate evaluation of the app's educational impact.

USER EVALUATION FINDINGS AND DESIGN IMPLICATIONS

AR Signifiers & Preview Experience

Preview mode helped users understand how AR signifiers are applied onto real-world objects. The user was able to recognise interactive objects more confidently after using preview feature. The existing signifier categories also generally satisfied the users' need and expectations.

Design Implication

Preview mode improves onboarding and reduces confusion during first time use and the current signifier system is effective, though future expansion of categories may improve flexibility & personalisation.

Timer Mechanism in Daily Tasks & Tests

User felt timers encouraged faster decision-making and reduced overthinking. Timers helped maintain learning flow by discouraging distractions like searching answers online, exiting the app, hesitating excessively and is more engaging and motivating.

Design Implication

Timers are more suited for Daily Recall Challenges and casual active recall activities while Tests are focused on learning retention and there will be no external factors such as reduced or optional time pressure.

Relevance to Real Language Learning

User considers the tasks and testing mechanisms relevant to vocabulary learning and revision. The user suggested including more additional linguistic information such as synonyms, related words or deeper contextual information for further in-depth learning. However, the flashcards intentionally contain essential information such as spelling, pronunciation and sentence context. This simpler approach was designed to simplify the interface, reduce cognitive overload, support short, repetitive learning sessions and encourage quicker active recall interactions.

Design Implication

Simplicity supports accessibility and casual learning behaviour. Additional information may be better implemented as optional expandable content rather than default content.

User Engagement & Learning Behaviour

Short repetitive interactions were seen as less intimidating than traditional study methods. The user responded positively to mechanisms that integrated naturally into everyday routines. AR interaction increased curiosity and engagement with vocabulary learning. The user can see themselves using this while waiting for their bus or on a lazy Sunday afternoon at home, the main point they liked was that they can use it everywhere and anywhere, and their learning journey is portable.

Design Implication

Everyday contextual learning may improve long-term engagement compared to isolated memorisation methods. Casual interaction appears important for sustaining motivation.

Dahlia



AGE	22
EDUCATION	Bachelor of Design
STATUS	International Student
OCCUPATION	Student
LOCATION	Brisbane
TECH LITERATE	High

> “I know the word, but I can’t always remember it when I need to speak it.”

Personality

Extrovert · Reader · Goal-oriented · Tech-savy

Bio

Dahlia speaks English, Mandarin, and Indonesian fluently. She is currently learning Korean and already understands basic conversations and sentence structures. However, she struggles with recalling vocabulary quickly and using natural expressions in real-life situations. She wants a more engaging and personalised way to practise Korean outside traditional study methods.

Core needs

- Enhance long-term memory retention of vocabulary
- Practise natural sentence construction and pronunciation
- Learn through interactive and visual experiences

Frustrations

- Forgetting words after memorising them
- Limited opportunities for real-world language practice
- Traditional flashcards feel repetitive and boring
- Difficulty sounding natural in conversation

Platforms

- Instagram
- Tik Tok
- Duolingo
- YouTube

Jayden



AGE	18
EDUCATION	University Student
STATUS	Student
OCCUPATION	Casual Barista
LOCATION	Brisbane
TECH LITERATE	High

> “I remember things better when learning feels interactive and fun.”

Personality

Curious · Creative · Energetic · Easily distracted

Bio

Jayden is a Game Design student learning Korean through games, livestreams, and K-pop content. As a user with ADHD, he struggles to stay engaged with traditional language learning methods like textbooks and repetitive flashcards. He prefers interactive and rewarding experiences that keep him actively involved in the learning process.

Core needs

- Stay engaged through interactive learning
- Improve vocabulary recall in daily situations
- Receive immediate feedback and rewards

Frustrations

- Easily loses focus during repetitive study
- Struggles to remember vocabulary without context
- Traditional learning apps feel monotonous
- Text-heavy interfaces become overwhelming

Platforms

- Discord
- Steam
- TikTok
- YouTube

REFERENCES

Bashneen, A. (2026). Ethical frameworks for data governance in the age of persistent augmented reality, robotics and biometrics. The American Journal of Interdisciplinary Innovations and Research, 8(1), 85–97.

Chen, K., Xiao, J., Liu, J., Tong, Q., Zhang, H., Liu, R., Zhang, J., Ajoudani, A., & Chen, S. (2025). Semantic visual simultaneous localization and mapping: A survey. IEEE Transactions on Intelligent Transportation Systems, 26(6), 7426-7449.

Mathur, H., & Gupta, V. (2024). Exploring the landscape: Applications and comparative analysis of object detection algorithms. World Journal of Advanced Research and Reviews, 24(02), 2157–2163.

Nafea, M. M., Tan, S. Y., Jubair, M. A., & Abd, M. T. (2022). A review of lightweight object detection algorithms for mobile augmented reality. International Journal of Advanced Computer Science and Applications, 13(11).

Viso Suite. (2024, October 18). Explore Computer Vision's Role in AR and VR.

Spiro, K. (2026). How to beat the forgetting curve. Easygenerator.

APPENDICES

Figure 2. Influence of Sound Design on Memory Test

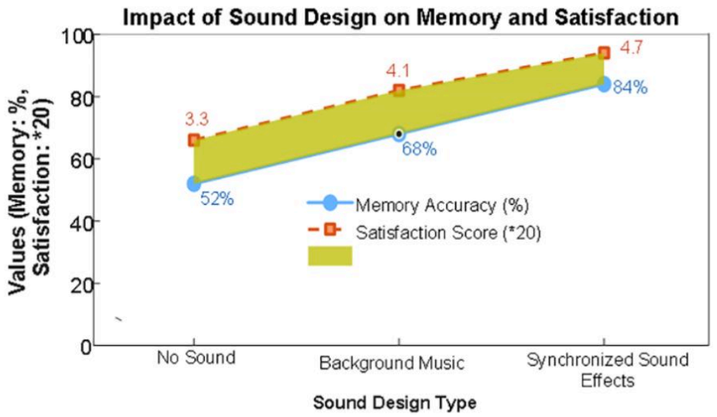
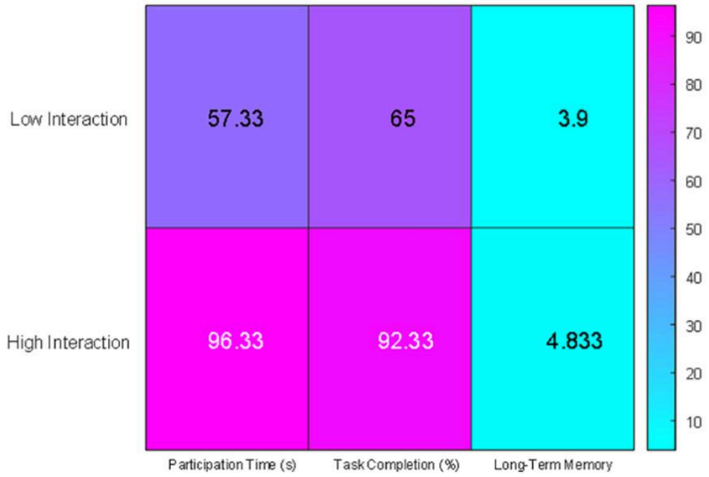
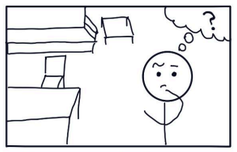
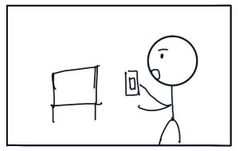


Figure 3. Influence of Interaction Design on User's Memory Points

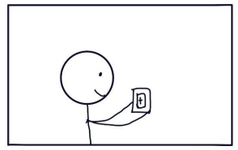




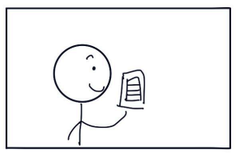
User wants to figure out how to say table & practice their korean before their trip to Korea.



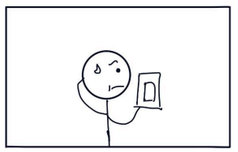
user takes out phone to try & identify the words to refresh their memory



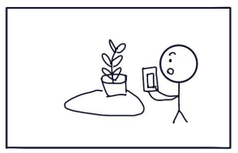
user decides to save this word in their inventory for future references



User can save the word into different categories. They find it useful that they can refer back to it later.



Afterwards, user can enter Test mode to practice & see where they stand linguistically.



User can also do their daily task under the daily task option wherever they are

APPENDICES

