Language Learning Application

Software Requirements Specification

CSCE247: Software Engineering

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1. <u>Introduction</u> -

Purpose:

A common problem with modern language learning apps is a poor balance of "gamifying" them for encouraged use and actual fundamental use. Our goal here is to develop a language learning app with the best of both worlds, including progression-based learning involving games and the like without losing the quality of the content. Users will be able to effectively begin learning a language beyond basic vocabulary but with the fundamentals of grammar and other aspects of a language that are absolutely required to fully grasp and comprehend a foreign language. The gamified content will not hold back on providing an effective learning experience. The structure of this application will support continued usage and learning of a foreign language without the struggles of common applications such as Duolingo. Reaching the middle ground in learning and having fun is essential to providing an overall excellent experience that is worthwhile for expanding your knowledge.

2. <u>Stakeholders</u> -

- **Internal**
    - Product Development Team
        - Responsible for building the app's core functionalities, maintaining the codebase, ensuring a seamless user experience, and integrating various features
    - Game Designers
        - design engaging games, challenges, and reward systems that motivate users to learn while having fun.
    - Quality Assurance
        - Delivering a polished, bug-free app that provides a positive user experience.

- **External**
  - Users/Learners
    - They can be of varying proficiency levels—from beginners to advanced learners.
  - Language educators
    - Teachers, tutors, and language experts who might use the app as a supplementary teaching tool or recommend it to their students
  - Investors
    - Scalability, user growth, monetization strategies, and potential profitability of the app
- **Others**
  - Beta Testers
    - feedback on usability, bugs, content quality, and overall experience
  - Third-Party Service Providers
    - essential services such as cloud hosting, data analytics, payment gateways, API integration
  - Competitors
    - Other language learning apps such as Duolingo, Babbel, Rosetta Stone, etc., which provide similar services in the language learning market

Personas:

JESSICA SINCIOCO

Age: 42
Location: Arkansas, USA
Gender: Female

BIO
Jessica is a 10th grade Spanish teacher in Arkanas. Originally, Jessica went into college at ASU to be a writiing major, but then studied abroad in Spain and decided to change her major since she loved the idea of teaching and loved Spanish. She currently has 2 kids and has been married fo 11 years.

NEEDS
- An app for her students to learn on their own time
- A way to easily grade their attempts, as she is very busy
- An app that is accessible no matter what sort of technology the students have available to them

Learning Methods

GOAL
To use an app for her students homework that keeps them engaged and allows her to easily grade their attempts. She also wants to be able to understand the difficulty of the problems they are solving and see where each of her students are.
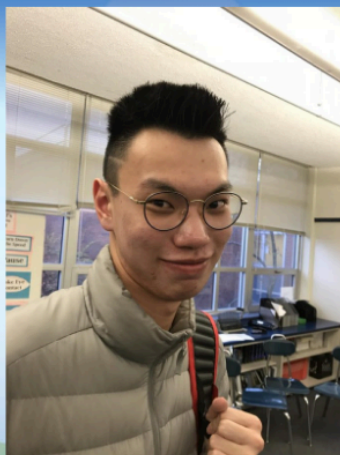
BEHAVIORS
- Basic understanding of technology
- Passionate about teaching and Spanish
- Loves to spend time with her children
- Rescues dogs to foster

SITUATION
Jessica doesn't have a lot of time on her hands. Between her 2 kids, husband, 6 classes she teaches and grading the classwork and tests for those classes. So she needs a method for her students to do homework that doesn't put any more stress on her.

MINH ZHANG

Age: 19
Location: Hong Kong
Gender: Male

BIO
Minh Zhang is a Chinese exchange student currently studying at the University of South Carolina (UofSC). Minh is passionate about learning English and is using a language-learning app to improve his skills. With a strong determination to master the language, he actively participates in various campus activities and immerses himself in the local culture. Minh enjoys exploring new places, making new friends, and sharing his Chinese heritage with those around him. His enthusiasm for both learning and cultural exchange makes him a vibrant part of the UofSC community

NEEDS
- needs an app that tailors lessons to his current proficiency level and adapts as he progresses.
- interactive speaking exercises, pronunciation guides, and real-time feedback to help him speak confidently and accurately
- A simple, user-friendly interface that supports multiple devices would ensure Minh can learn anytime, anywhere.

Learning Methods

GOAL
- Learn and retain 50 new English words each week, focusing on words that are commonly used in academic and social settings.
- Minh's biggest goal is to into develop the habit of thinking in English and using the language spontaneously in all daily activities by the end of his exchange program. He really wants to impress his crush by ordering food in English

BEHAVIORS
- sets specific goals
- heavily school motivated
- Goes out to eat frequently
- Uses WeChat to text his American friends

SITUATION
Minh Zhang, a Chinese exchange student at the University of South Carolina, faces a challenge with his upcoming group presentation for his sociology class. While his reading and writing skills in English have improved, he struggles with listening comprehension and speaking fluently, especially in fast-paced group discussions. Feeling nervous about speaking in front of his classmates, Minh worries that his accent and lack of confidence will hinder his ability to effectively contribute to the presentation and engage with the audience.

JOHNATHAN ALBRIGHT

Age: 23
Location: Columbia
Gender: Male

BIO

Johnathan Albright is a 4th year Engineering student at the University of South Carolina and has waited until his final year to finish his foreign language credit. With a newfound goal of completing these classes before graduation. Learning throughout college has been mostly a breeze for this hard-working Senior, as he has spent a lot of time developing personal methods for studying and advancing his education. Johnathan has utilized countless resources, among them being various apps that streamline studying and make it less of a hassle while introducing hands on activities.

NEEDS

- A functional application with practice based learning
- Progression in the app that beats other common apps
- Motivation in the app to continue using it

Learning Methods

GOAL

Johnathan's goal with this application is to utilize a fun, progression based study path that will help enhance his studies and finish his degree with good standing in every class, including this foreign language class that differs from his typical courseload.

BEHAVIORS

- Studies frequently
- Uses mobile device daily
- Frequents campus Cafe
- Plays video games
- Reads books for fun

SITUATION

Johnathan wants to learn a language for his class and opens the application of his choosing to help him study more efficiently. As someone who loves video games, he enjoys the progression based learning with incorporated daily motivation goals.

CHASE BENZ

Age: 28
Location: Texas, USA
Gender: Male

BIO

Chase Benz is a construction worker in Texas. He travels to where the work is and is always meeting new people who don't speak the same language he does. He always finds it fustrating because he is a very friendly person who want to have conersations with everyone he works with. At most of the sites, the second major language that is spoken is spanish. Since he went steaight to the job force for work, he has not had an opportunity to learn a foreign language. Chaze enjoys playing sports and learning new things where he can. His dream is to go to college and major in something that he will find interesting.

NEEDS

- He needs an app that will allow him to hold conversations with his coworkers that don't speak English
- He needs an app that will keep him motivated to continue to studying
- He needs an app that has different study methods so he can study in different way

Learning Methods

GOAL

- Learn and retain something different each week to build up hid foundation for the language.
- Chase Benz goal is by the end of studying Spanish, is that he can hold basic conversation with the workers that he could not speak to prior.

BEHAVIORS

- Motivated to learn a new language
- When he is not at work he likes to workout
- Social life is low because he is always working or working out.

SITUATION

His situation is that he is a very busy guy. His work has him working long hours and he tries to workout to maintain his healthiness. He cooks most of his meals at home and has chores to do since he lives all by his self. This is why he needs a convenient learning app in order to fit into his schedule.

3. <u>Constraints</u> -

Time Constraints:
- Limited to the development time of a few months (length of College semester)

Budget Constraints:
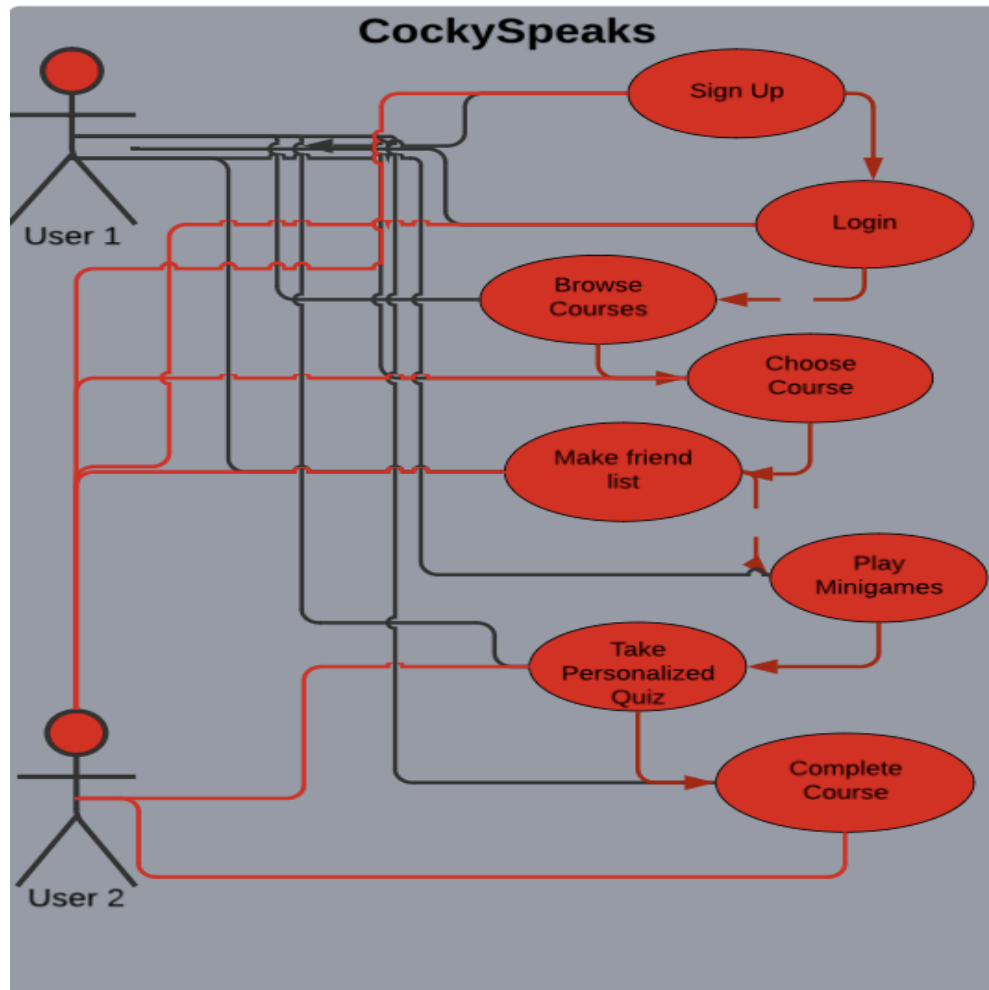- There is no budget available for this project or any money allocated.

Technical Constraints:
- Limited to specificity of assignment in regards to code usage
- Mostly Java usage, could contain other architectures to build upon.
- Application must be usable by various devices

4. <u>Overall Description</u> -

The application being developed is intended to promote language learning and grant users accessibility to a streamlined experience for said purpose. With the target demographic being all age ranges, this app will incorporate functionality that is easy to use while trying to utilize features that promote continuous usage by our users. We will include progression-based functionality that encourages the user to treat it as a game and a learning device. This intent is meant to give users a reason to use our application above others and to introduce fun into our learner's experience.

5. <u>User Case</u>

6. Functional Requirements

1 Name	Requirement	Priority	Rationale
User Registration/Login	The system shall provide a secure user registration with email verification	1	Essential for users to access personalized features securely
	The system shall provide a secure login process with strong password requirements.	1	This ensures user account protection
Solo or Group?	The system shall prompt users to select a learning mode upon initial login.	2	Allows the app to tailor the learning experience based on user preference
1.1	The system shall have a solo option for one of the learning modes		
1.2	The system shall have a group option for one of the learning modes		
	The system shall allow users to change the learning mode preference in account settings.		This provides user to not be stuck in one learning mode when asked in the initial login
Complete Exercises	The system shall offer interactive exercises categorized by difficulty level.	1	This facilitates effect learning through varied practice methods.
	The system shall offer interactive challenges categorized by topic.		This ensures comprehensive coverage of language aspects.
Track progress	The system shall display user progress through skill level indicator.	1	This helps users understand their proficiency in specific areas.
	The system shall track time spent learning for each user		Provides insight into user engagement
	The system shall provide a dedicated progress dashboard for users		This centralizes progress information for easy user access
Access Multimedia Resources	The system shall provide a multimedia resource library containing audio lessons.	2	This enhances learning through auditory content.
	The system shall provide a multimedia resource library containing video tutorials.		This enhances learning through visual content
	The system shall provide a multimedia resource library containing interactive presentations		This enhances learning through engaging, interactive content.
	The system shall organize multimedia resources by language level		This makes easier to navigate for users appropriate content
	The system shall organize multimedia resources by topic		This allows users to focus on specific areas of interest.
Provide Feedback	The system shall implement a structured feedback mechanism allowing users to rate content	2	Provides quantitative data for content improvement.
Provide User Support	The system shall have a support staff to assist with user issues	1	Allows users to get quick help when facing difficulties with the app
	The system shall implement a structured feedback mechanism allowing user to report issues		Helps indentify technical problems quickly.
	The system shall implement a structured feedback mechanism allowinguers to suggest improvements.		Encourages user involvement in app development
Manage Content	The system shall provide an administrative interface for content management	2	This facilitates efficient content updates.
Monitor User Activities	The system shall allow administrators to track user engagement	2	This allows adminstrators to see what are people learning or stuck on which allows adminstrator to make the necessary actions to fix that problem
	The system shall allow administrators to track user activity		This allows administrators to see if there app is being used and make the necessary changes to make their user activity to go up.
Ranking	The system shall implement a tiered ranking system with clearly defined criteria for advancement.	2	Motivates users to progress through clear goals
	The system shall display user ranks prominently in their profile		Provides visible recognition of user achievements
Portability	The system shall support a minimum of five languages intially.	3	This offeres a diverse range of language options to the user.
Customization	The system shall allow for customization based on what topics they are interested in. (Business, education, etc.)	3	Makes app easier to use for user
	The system shall allow users to adjust content difficulty		This allows the user the individual user needs.
Cultural Integration	The system shall incorporate cultural conext in lessons	2	This provides culturally relevant language skills.
Community Features	The system shall include moderated dicussion forums	2	Allows users to interact with one another as well as foster a sense of community
Notifications	The system shall send customizable push notifications for learning reminders	2	This keeps users engaged without being intrusive
Multilingual selection capability	The system shall have foreign languages to choose from	1	incorporating foreign language options into the system is essential for broadening accessibility, enhancing user experience, complying with regulations, gaining a competitive edge, and improving support and training processes.
Spanish language support	The system shall support Spanish as a choice		incorporating Spanish support is a strategic decision that enhances user experience.
French language support	The system shall support French as a choice	3	incorporating French language support addresses the needs of a significant and diverse user base
Japanese language support	The system shall support Japanese as a choice	3	incorporating Japanese language support addresses the needs of a large and important user base
Foreign language proficiency	The system shall asess user language proficiency through a comprehensive placement test.	2	This ensures users start at the appropriate difficulty level.
	The system shall categorize users into three levels based upon the placement test		Tailors content to user proficiency
1.1 beginner			
1.2 intermediate			
1.3 advanced			
	The system shall provide unlimited daily lesson attempts		Allows user to be able to have flexible learning
Alphabet and symbol system	Beginner path shall teach the user the languages alphabet/ symbol system	2	teaching the language's alphabet or symbol system in the Beginner path is essential for laying the groundwork for further language learning.
Number system	Beginner path shall teach the user the number system	2	teaching the number system in the Beginner path is crucial for equipping users with foundational skills needed for practical interactions and further language learning.
Present tense verb conjugation	Beginner path shall teach present tense verb conjugation	2	teaching present tense verb conjugation in the Beginner path is essential for developing foundational language skills
Future tense verb conjugation	Beginner path shall teach future tense verb conjugation	2	teaching future tense verb conjugation in the Beginner path is essential for enabling users to discuss upcoming events and plans
Past tense verb conjugation	Intermediate path shall teach past tense verb conjugation	2	teaching past tense verb conjugation in the Intermediate path is essential for enabling users to discuss past events
Complex sentence structure	Intermediate path shall teach complex sentence structure	2	teaching complex sentence structures in the Intermediate path is essential for advancing learners' language proficiency
Sentence formation	Intermediate path shall explain sentence formation	2	explaining sentence formation in the Intermediate path is crucial for deepening learners' grammatical understanding
Grammar	Intermediate path shall teach grammar	2	teaching grammar in the Intermediate path is essential for advancing learners' language proficiency, improving communication skills
Vocabulary expansion	Advanced path shall teach niche vocabulary	2	teaching niche vocabulary in the Proficient path is essential for advancing learners' mastery of specialized language use
Comprehensive access to previous course lessons	Advance path shall have access to previous course lesson in previous proficiency levels (beginner and intermediate)	2	providing access to previous course lessons in the Proficient path is crucial for reinforcing foundational knowledge
Features	The system shall have game-like features	2	incorporating game-like features into the system enhances engagement
Vocabulary matching games	The system shall have vocabulary matching game	2	a vocabulary matching game enhances the acquisition, retention, and application of vocabulary through interactive and engaging methods.
Fill in the blank games	The system shall have fill-in-the-blank game	2	a fill-in-the-blank game enhances language learning by providing contextual practice
Association game	The system shall have association game	2	enhances learning by reinforcing conceptual connections
Creating flash cards	The system shall allow the user to create their own flashcards	2	allowing users to create their own flashcards enhances the personalization
Saving flashcards	The system shall allow the user to save their own flashcards	2	allowing users to save their own flashcards enhances accessibility
Lesson Difficulty Progression	The system shall automatically increase the difficulty based on user performance	1	This allows the user to improve their language skills through progressively challenging content
	The system shall introduce new concepts as the user demonstrates mastery of current material		This provides a logical progression in learning.
User Progress Storage	The system shall store completion status for each lesson.	3	This allows user to to track completed content so they don't redo the same lesson.
Navigation Menu	The system shall provide a comprehensive menu for accessing personal information and app features	2	
Post-Lesson Encouragement	The system shall display encouraging messages after each completed lesson	2	This motivates the user to continue their learning journey.
Password Recovery	The shall implement a secure password recovery process	3	This allows users to regain access to their account without creating a new one
	The system shall include email verification in teh password recovery process		This porves a secure method for account access restoration
	The system shall use temporary access codes for password recovery		This proves a secure method for account access restoration
Streak Counter	The system shall require completion of at least one lesson for daily streak maintenance.	3	This sets a clear achievable daily goal
Streak Maintenance Notifications	The system shall send users a push notification when the user's has not completed one lesson signaling the end of the user streak	3	This reminds the user to complete a lesson to main their streak, encouraging consisten app usage.

7. Non-Functional Requirements

- ## Operability

   The user shall be able to comfortably use the software with minimal chance for misinterpretation of mechanics.

- ## Compatibility

   The software shall be compatible with different types of mobile devices.

- ## Legality

   The software shall comply with South Carolina and Columbia laws.

- ## Safety

   The software shall maintain user information in a minimalistic fashion as to keep information secure.
   The software shall allow users to request personal security data at any given point.

- ## Robustness

   This application shall be formed in a way that is easily maintainable.
   This application shall be updateable.

This application shall inform users of required updates.
This application shall properly provide patch notes for users to view.

8. <u>Definitions and Acronyms</u> -

- **Bug: an error that causes an issue in code**
- **Codebase: a collection of code files used to build an application**
- **Scalability: to be capable of resizing; in this case the application**
- **API: Application Programming Interface, which allows software to communicate with one another**
- **Patch Notes: documentation of version updates and features**
- **UI: User Interface, essentially what the application looks like to the user.**

9. <u>Competitive Analysis</u> -

Product 1: Rosetta Stone

Strengths	- Pretty UI - Large array of languages available to learn - Efficient introductory knowledge - Beginner friendly
Weaknesses	- Beyond the pretty UI, it is overall bloated. - Predatory notices to pay for usage - Lack of comprehensive language knowledge. As noted, they have decent and effective beginner knowledge but almost no structural efficiency. Using this application alone to learn a language is ineffective. - Lacks enticement in regard to user learning, problems typically fall under a provided sentence where you fill in a single blank.
Audience/Focus	- The audience and focus here is a large age range for anyone who wants to pick up a second language.

	- Not very friendly for younger users who may be learning their first language

Product 2: Duolingo

Strengths	- Free to use - Has a progression system that entices continuous usage - Minigames - Good for review and supplemental learning - Easy-going UI and easy to use
Weaknesses	- Only good for introductory content - Lacks fundamental understanding of a majority of available languages which impacts the learning experience. - Not useful for fully learning a language - Order of learning is biased towards a certain direction and does not allow user to deviate
Audience/Focus	- The audience here includes all age ranges, but is more geared towards the student population base. Duolingo is a popular tool used by language teachers as a supplement with core content. Easy to use for any age range.

Product 3: Babbel

Strengths	- Accents included with pronunciations to give a better range of understanding - Focuses on introductory phrases that will be more useful upon visiting a country initially before getting into more material - Babbel uses a more traditional approach to language learning and focuses on understanding grammar rather than just vocabulary and phrases
Weaknesses	- You have to pay to use this application - Content availability is dependent on the language, some languages simply have significantly less content than others - Complicated layout - Repetitive exercises with no incentive
Audience/Focus	- Audience includes all age ranges and is meant to break language barriers. Out of the three applications analyzed, this one seems to have the oldest age range

	of users.

10. References -

No external sources were used.

11. Appendices -

All appendices procured via Google Scholar:

https://riunet.upv.es/handle/10251/80112 - **A review of challenges and trends in mobile language learning applications**

https://www.cambridge.org/core/journals/language-teaching/article/abs/materials-developmentfor-language-learning-and-teaching/AB9B247D6CDA981F0E3BDCD8FC3DBE36 - **Study on language learning and teaching**

https://ieeexplore.ieee.org/abstract/document/1565251 - **Study in regards to security details for Java on mobile applications**

https://dergipark.org.tr/en/pub/ijemme/issue/27883/306139 - **Brief article on the development of mobile applications using Java (specifically for Android)**

https://link.springer.com/article/10.1007/s10639-020-10287-0 - **Summary on creation of mobile app using Java that teaches mathematics (in our case we will do language instead)**