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"Let's Benkyou": Japanese Language Learning App

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Abstract: As Japanese influence grows in Malaysia, whether culturally, educationally, or commercially, more people wish to learn the Japanese language. As a result, the "Let's Benkyou"Japanese language mobile learning app was created to assist such persons in beginning their learning journey. To develop this application, the Prototype Model is used as the project methodology. Before developing the application, the problem statements, the objectives and all the application requirements were identified. The Dart programming language and the Flutter framework were used to develop this application. The database is built using the Firebase platform. The application is hoped to help people to study Japanese in an effective way.

Keywords: Japanese, JLPT, mobile learning

1. Introduction

With the increasing numbers of Japanese companies, as much as 1,500 companies operating in Malaysia and is creating over 400,000 jobs [1], the need for Japanese language education in Malaysia also increases over the years. A Japanese language learning app is an easy way of allowing students to learn Japanese in their spare time. However, most language learning apps have limited functionality because learning a new language requires a lot of information, including vocabulary, grammar, conversational survival skills, and more. Therefore, it is critical to pinpoint the flaws in current language learning applications and develop a new one that can outperform the old one in terms of quality in order to address the issue.

The next section will discuss the literature review and research of the existing applications. The section after that will be methodology that discuss the phases in the prototype model that are used to develop the proposed application. The last section which is section 4 will discuss the analysis and design which will include UML diagrams.

2. Literature Review

2.1 Japanese language

Worldwide, there are 128 million native Japanese speakers. In terms of native speakers, this places Japanese as the ninth most extensively used language in the world. The most common language spoken

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in Japan is Japanese, which is also its official language. However, there are also some Japanese-speaking populations in the US, Taiwan, and Korea [2]. In this proposed application, it is aimed to teach the learners the basic of the Japanese language to at least basic conversational level.

2.2 Mobile-Assisted Language Learning (MALL)

Mobile technologies and language learning have given rise to a brand-new field of research called Mobile-Assisted Language Learning (MALL). MALL is a revolutionary learning method that enhances language learning using mobile devices like smartphones and tablets. Language learners use MALL to connect to wireless networks, communicate with learning websites via SMS, mobile e-mail, and learning applications, and access learning materials [3].

2.3 Existing Application

There are many different mobile applications currently on the market. To identify the apps' strengths and weaknesses, research is conducted on a few chosen, similar applications. A comparison are made to provide direction for the development of the proposed application.

2.3.1 Duolingo

With over 200 million users, Duolingo is arguably the most well-known language learning app available on the market. Duolingo is well known due to its effective curriculum, clean design, and appealing gamification for studying. Duolingo offers tons of different language to learn. One of the most popular languages to learn from the apps is Japanese language. The Duolingo app's popularity is due to a variety of factors, one of which is the app's distinctive user experience, which keeps users interested and inspired to study. However, even the most popular app is far from perfect, it has its own flaws that are very noticeable by the users. One of the flaws is that Duolingo also often does not provide explanation to the grammar and vocabulary, leaving the learners confused how they are wrong or correct in certain questions.

2.3.2 JapanesePod101

JapanesePod101 is a real-world language learning software that teaches users all they need to know to get better at the language using a combination of video and audio sessions. Additionally, it gives courses that include additional reading assignments & comprehension tests with increasing levels of information for each lesson. The massive library of audio, video and the textual immersion method has a successful track record for teaching learners the Japanese language [4].

2.3.3 Renshuu

Renshuu (meaning “practise” in Japanese) is an app that started in 2020. Which means this app is rather young compared to the big names such as Duolingo and Anki. However, it does have its own distinct features to help the learning progress [5].

To be able to identify the improvement to be made in the proposed application, a comparison table between the existing application listed above and the proposed application are made. Table 1 shows the comparison of features of the existing applications and the proposed application.

Table 1: Comparison between existing application and proposed application

Features	Duolingo	JapanesePod101	Renshuu	Let's Benkyou
Login & Logout	✓	✓	✓	✓
Progression tracker	✓	×	✓	✓
Advertisement Free	×	✓	✓	✓
Assessment	×	✓	✓	✓
Daily Reminder	✓	×	×	×
Video Resources	×	✓	×	✓
Paid Subscription	✓	✓	✓	×
Learning Games	×	×	✓	×
Huge resource bank	×	✓	✓	×
Community Forum	×	×	✓	✓

3. Methodology

The Systems Development Life Cycle (SDLC) provides structure to the difficulties of moving from the start of your project to its completion without skipping a step [6]. The methodology used in developing the proposed application is the prototyping method. The prototyping method has five development phases, which are planning, analysis, design, prototype generated and implementation. Figure 1 shows the five main phases in the prototype model.

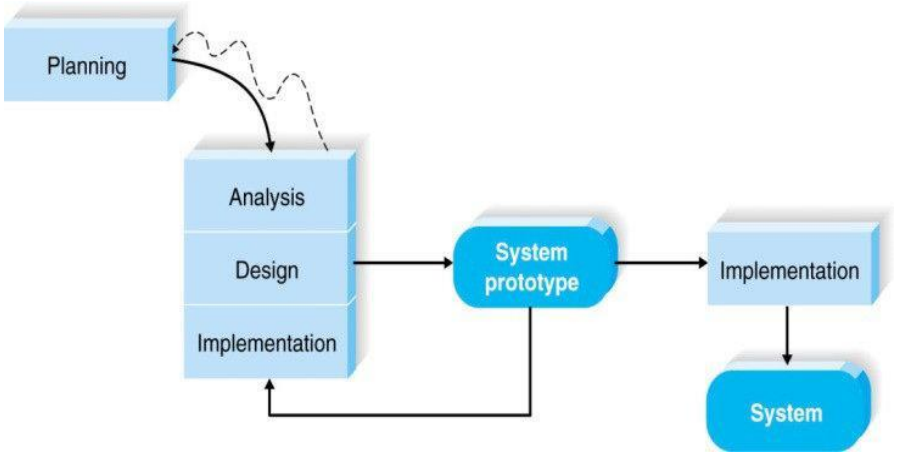

Figure 1: Prototype Methodology

3.1 Planning Phase

The first stage of a prototype model is the planning. The project priorities are established at this stage, and a strong project plan is developed. The tasks involved in the planning process include determining the development framework, creating the project plan, and establishing the project timeline. A comparison between three current systems and the proposed application is made after an evaluation of the features and functioning of existing systems.

3.2 Analysis Phase

In the analysis phase, the collected data is analyzed, and the project objectives are converted into specified system functionalities for advancement and improvement. The needs of users are considered when gathering the system's requirements. A Google Form questionnaire was distributed to a Japanese learning community to identify the functionality needed by them. From the information collected from the questionnaire distribution, requirements are organized around objects, and it integrates with both data and functions.

3.2.1 Questionnaires

The data is collected from 15 respondents. From the data collected in the questionnaires, it shows that most of the respondents want to have a simple and easy interface for an education application. It also shows that the respondents finds that having a community to learn together is very helpful.

3.3 Design Phase

The system is created during the design process to satisfy the specifications noted during the earlier phases[7]. All the functional and non-functional requirements obtained in previous phases can be used into designing the proposed application using wireframe. At this stage, wireframes are created to act as a roadmap for the creation of the user interface. In order to concentrate on the essential structure in the early phases of development, it is common to start with a simple black-and-white layout before adding visual elements like colour, font selection, logos, or any other organic design elements and content.

3.4 Implementation Phase

The implementation phase begins after getting the user acceptance of the proposed application. The existing application will be developed based on all the records from the previous steps. The “Let’s Benkyou” application will be developed by using Visual Studio IDE. Meanwhile the front-end system is designed using Flutter and Dart programming language. The suggested application is configured using Firebase with fully defined security and recovery processes. The database will be kept on a Firebase Firestore server.

3.5 Testing Phase

All the lines of code are created and put into use during the testing process. It was designated as the most crucial aspect in this model. Without testing, it is challenging to deliver reliable software. An application's testing process reveals any bugs and errors in the coding or user interface. Software testing is a technique for verifying whether the actual software product satisfies the desired specifications and guarantees that it is error-free. It comprises putting software parts through their paces with the aid of manual or automated techniques in order to assess one or more interesting properties[8].

4. Design and Analysis

The architecture of a system reflects how its structure, features, and connections are thought of. It describes how each system component is connected to each other and to the data link that links them.

4.1 Use Case Diagram

The use case diagram is the behaviour diagram to summaries the details of the system and its interaction with the system. It provides a graphic description of the actors involved in a system, the various function required by those actors, and how these multiple functions interact. The user and the admin are the actors for the proposed application. The use case diagram for the proposed application is presented in Figure 2.

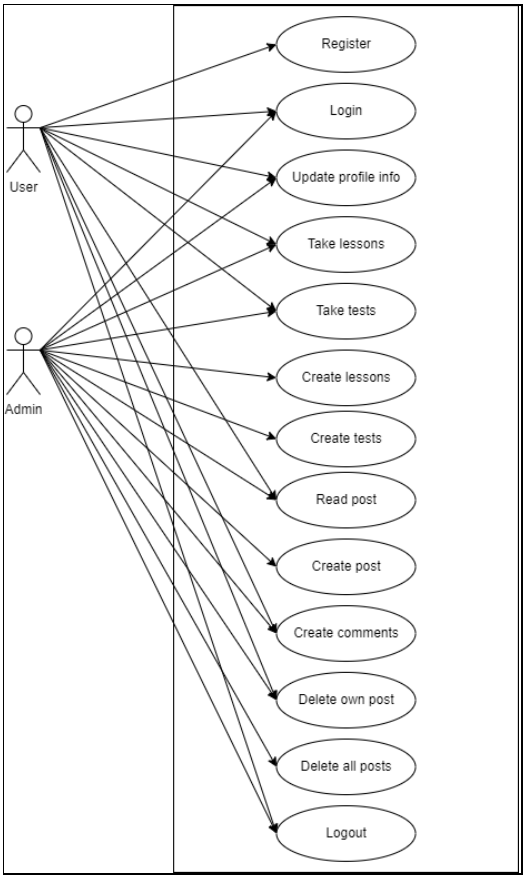

Figure 2: Use case diagram for proposed application

4.2 Activity Diagram

An activity diagram shows how a system's activities move from one to the next. It is used to describe how different levels of abstraction of operations are coordinated to provide a service [9]. Figure 3 shows the activity diagram for user and Figure 4 shows the activity diagram for admin .

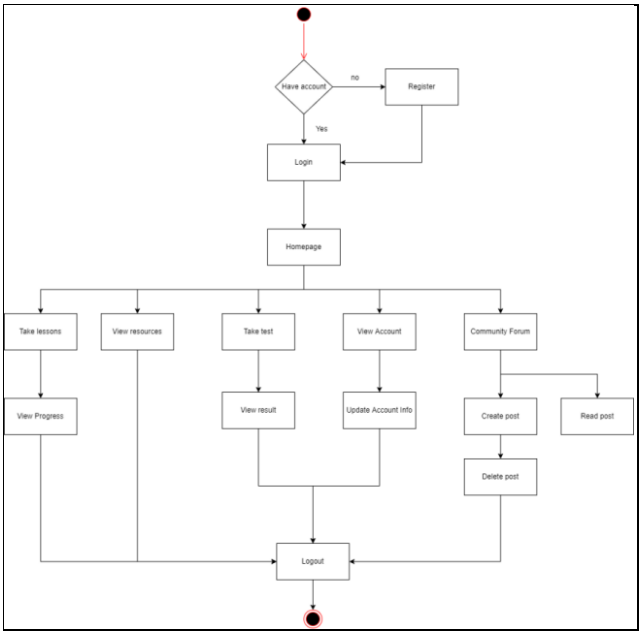

Figure 3: Activity diagram for user

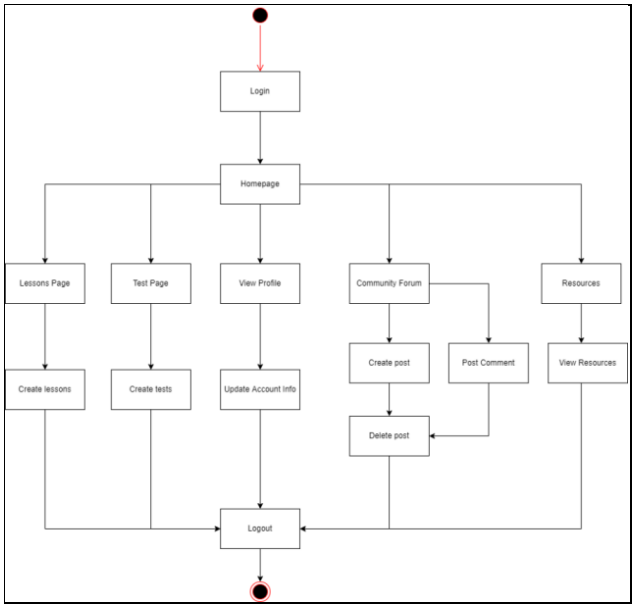

Figure 4: Activity diagram for admin

4.3 Class Diagram

Class diagram is a static diagram that represents the static view of an application. Class diagram is not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software application. Figure 5 shows the class diagram for the proposed application.

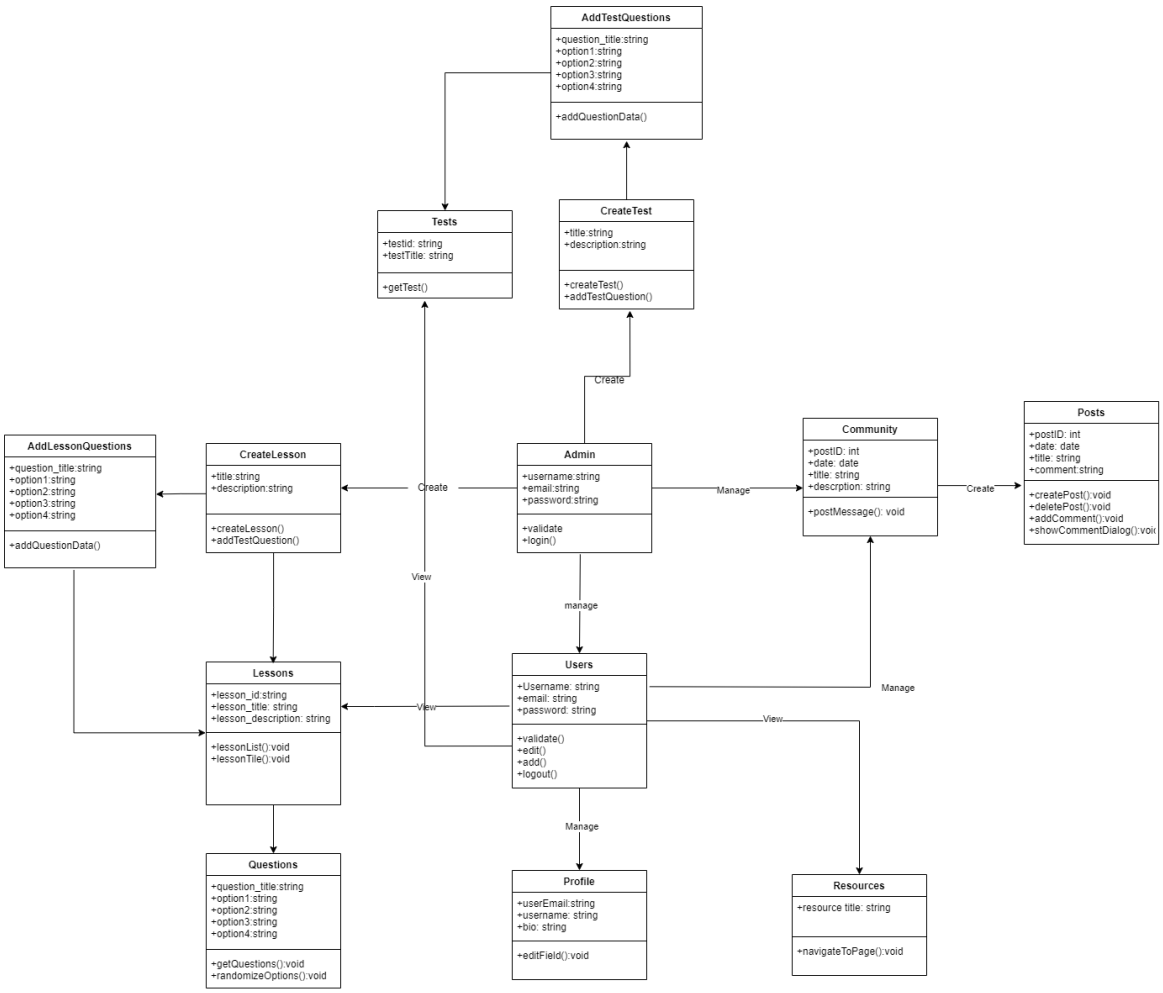

Figure 5: Class diagram of the propose application

4.4 User Interface Design

Human users interact with computers, websites, and applications through user interfaces. Effective user interfaces should be simple and intuitive to use, requiring little effort from the user to achieve the desired results. A wire frame is a low-resolution design layout that displays the page's functional elements. Figure 7(a) and 7(b) shows the wire frame of the proposed application.

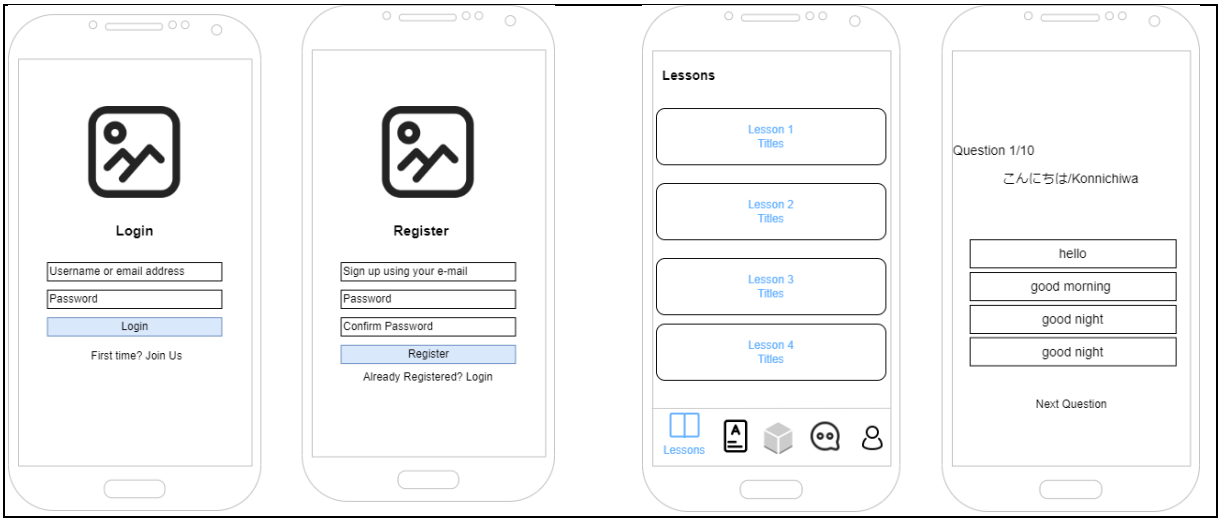

Figure 7(a): User interface

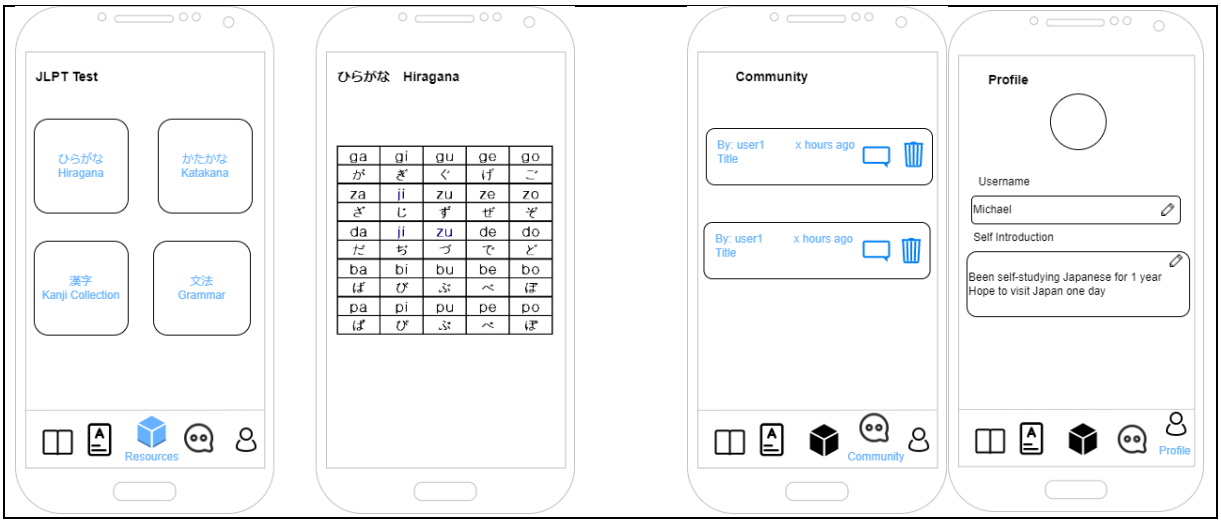

Figure 7(a): User interface

4.2 Implementation

Implementation is the stage within the project development process where programming code is written according to the design of the system. The app is developed using Flutter framework and the coding is written using Dart programming language. The Firebase Authentication is used to manage the login and

register authentication and the Firestore Firestore are implemented in the app to act as database and store all the data. Figure 8 shows the implementation of Firebase in the main.dart of the app.

Figure 8: Firestore connection segment in main.dart

5.1 User management module

Users should be able to manage their information through user management module, which includes registration of new account, login, logout,view lessons,take tests,view resources, use the community features and edit their profile details.

4.2.1 Register & Login module

Figure 9(a) shows the register page of the application. To start using the app, the user need to start by creating a new account by entering their email and password. After that, the user can access the login

page by clicking the “Already Register? Login” button showed in Figure 9(b). The user may now login using their registered email and password.

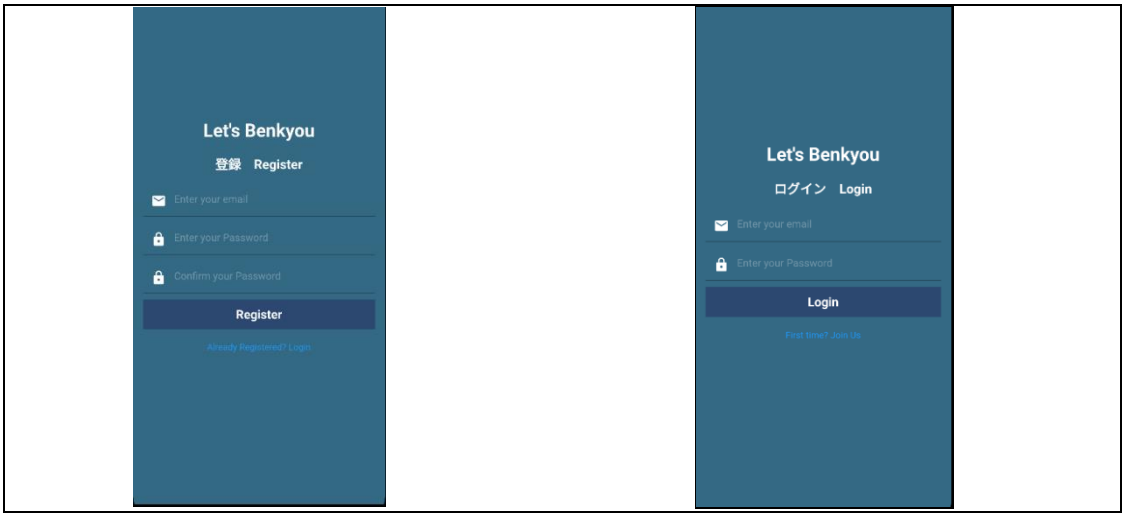

Figure 9(a): Register page of the application **Figure 9(b): Login Page of the application**

4.2.2 Lesson Module

Figure 10(a) shows the Lesson page from the user perspective. The users can choose from the list of lessons available in the app. After selecting a lesson, the user will be redirect to the questions page which the user will be answering a series of questions showed in Figure 10(b).

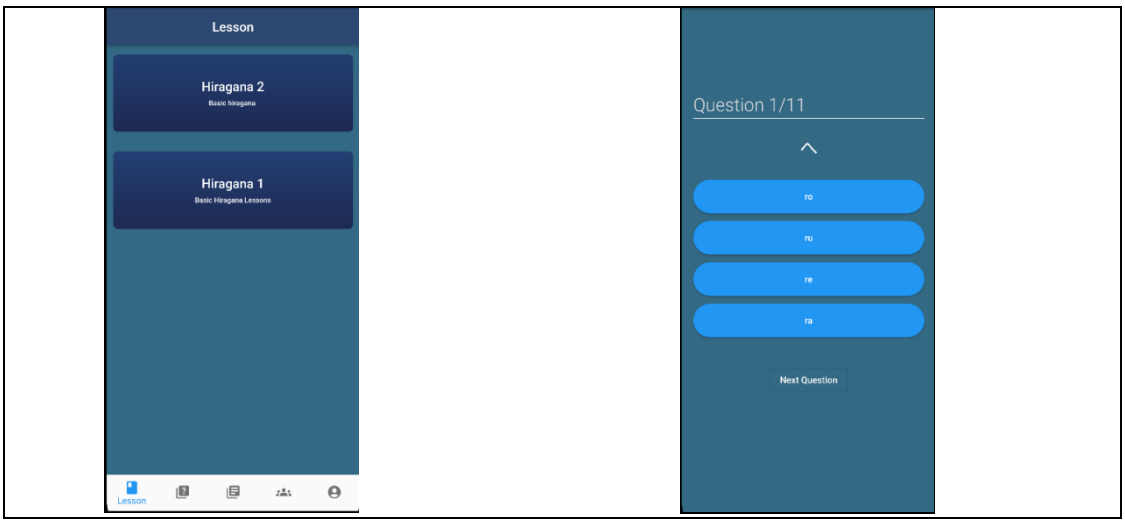

Figure 10(a): Lessons Page for user **Figure 10(b): Questions inside lessons page**

Figure 11(a) shows the lesson page from the admin perspective. There is an additional “+” button on right side of the app bar. By pressing the button, the admin is redirect to a create lesson page and after filling the lesson title and description and pressing the submit button, the admin can add questions

showed in Figure 11(b). The admin can add questions after filling all the fields and pressing add question button. The admin can press the submit button after they have finish adding all the questions.

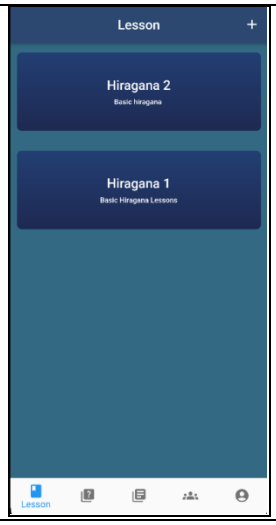

Figure 11(a): Lesson Page for the admin

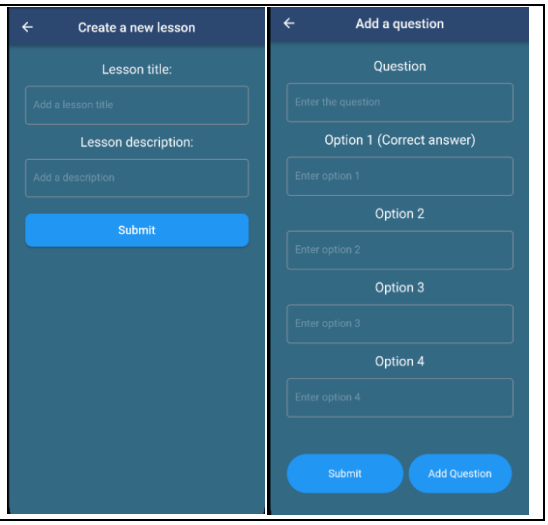

Figure 11(b): Adding lessons and questions

4.2.3 Test module

Figure 12(a) shows the test page from the user perspective. The users can select from the list of tests to test their language skill. After they selected a test, they will be redirect to the questions page that they can answer a series of questions.

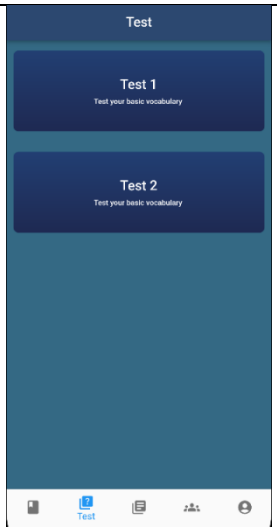

Figure 12(a): Test Page for user

Figure 12(b): Question page after the user selected the correct answer

Figure 13(a) shows the test page from the admin perspective. Similar to the lesson page, there is a "+" button that allows the admin to add more test and questions shows in Figure 13(b). After filling the test title and description and pressing the submit button, the admin can add questions showed in Figure 13(b). The admin can add questions after filling all the fields and pressing add question button. The admin can press the submit button after they have finish adding all the questions.

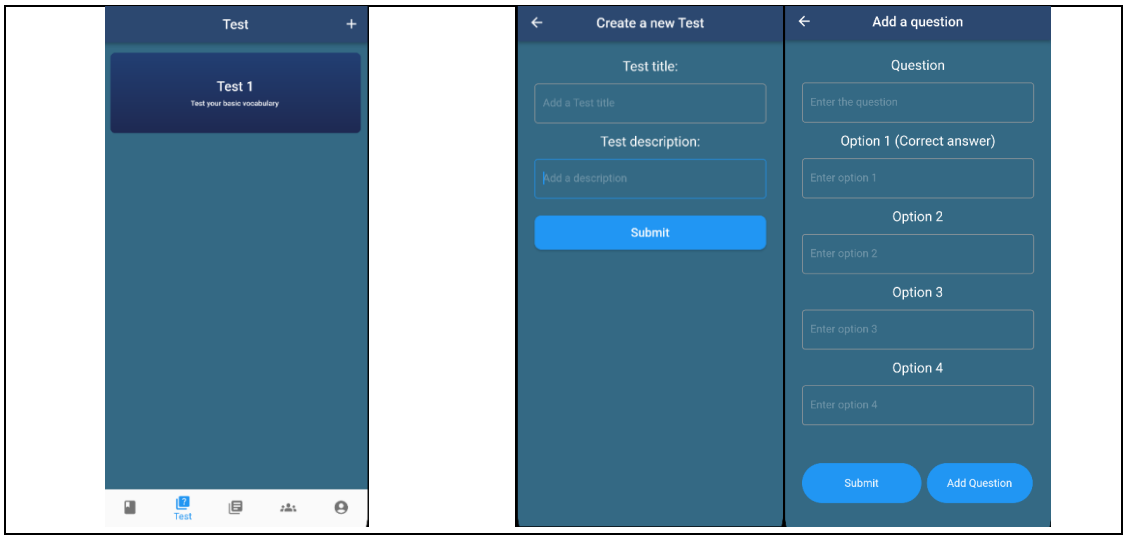

Figure 13(a): Test Page for admin

Figure 13(b): Adding test and questions

4.2.4 Resources module

Figure 14(a) shows the resources page of the app. The resources page is used by the users to directly view the general knowledge of the Japanese language at anytime. Figure 14(b) shows the contens inside the Hiragana and Katakana tabs.

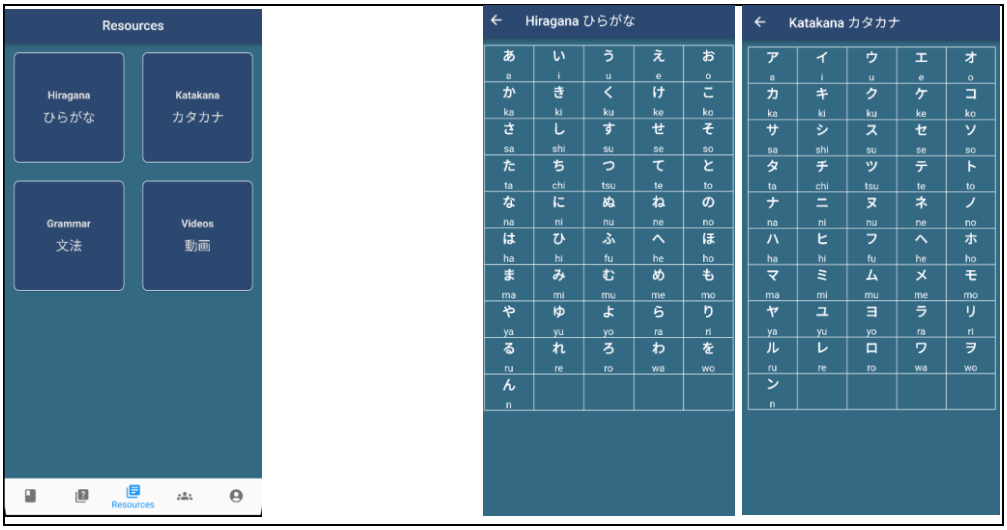

Figure 14(a): Resources Page

Figure 14(b): Inside the Hiragana and Katakana tabs

4.2.5 Community Module

Figure 15 shows the community page of the app. In this page, every user can write a post at the text field below and post it to this page and every users can view it. Additionally, the users can comments on the posts that they or other users had created. The users can delete the posts that they have created by pressing the delete button on the left that only appears on their own posts. The admin also have the authority to delete any post that the users had created.

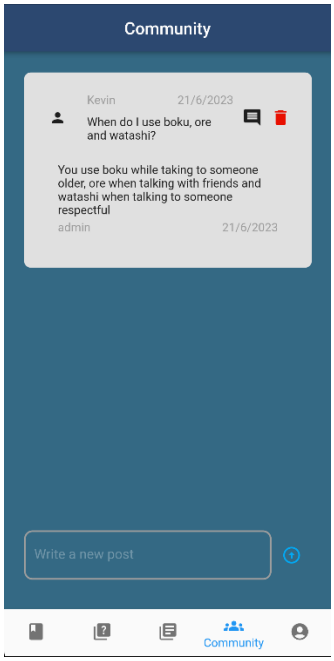

Figure 15 : Community Page

4.2.6 Profile Module

Figure 16 shows the profile page for the users and admin. From here, the users can edit their username that will show up in the community page when they post something. The users can also edit their self introduction or bio. There is also a SignOut button that let the user sign out and return to the login page.

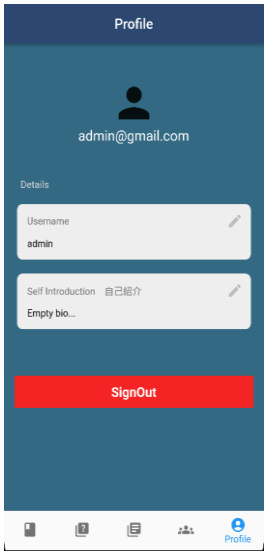

Figure 16 : Profile Page

4.3 System Testing

System testing is a form of software testing that focuses on guaranteeing the correct functioning of a web application that has been created. Its objective is to confirm that the system fulfills all required functional and non-functional requirements. Within this section, there are two types of tests are conducted: functional testing and user acceptance testing.

4.3.1 Functional Testing

Functional testing is a type of testing that evaluates the individual functions or features of a software system to ensure that they work correctly according to the specified requirements. It focuses on testing the system's behavior and functionality by validating its input, output, and internal processes. Table 3 shows the result for the functional test.

Table 3: Functional Testing

Function	Test Case	Expected Output	Result
Login/Logout	Inputs correct email and password.	User able to login based on the correct email and password	Pass
	Inputs incorrect email and password.	An dialog message pop up showing the error to the user	Pass
	Logout	Redirect to login page.	Pass
Registration	Inputs email, password and confirm the password to register	The user's account is created and the user will be redirect to the main page	Pass
	Inputs the wrong email format, wrong password confirmation	An dialog message pop up showing the error to the user	Pass
Lessons	Click on the lesson tile to navigate to the questions	A series of questions is showed	Pass
	Click on any option in the question	The correct option will be turned color green and the rest of the options will turn to red.	Pass
	Create lessons and options	New lesson successfully created	Pass
Test	Click on the test tile to navigate to the questions	A series of questions is showed	Pass

Function	Test Case	Expected Output	Result
	Click on any option in the question	The correct option will be turned color green and the rest of the options will turn to red.	Pass
	Create tests and options	New test successfully created	Pass
Resources	Click on each tabs on the resources page	Able to view each tabs with their contents	Pass
Community	Type on the text field at the bottom and submit	The post successfully show up on the page	Pass
	Click the comment button and write a comment	The comment shows up under corresponding post	Pass
	Press the delete button	The post is deleted and removed from the page	Pass
Update Profile	Update username and bio at profile	User's username and bio are changed	Pass

4.3.2 User Acceptance testing

UAT, or User Acceptance Testing, is a critical phase in software development. It involves testing the system's functionality and usability from the end-users' perspective. The primary goal of UAT is to gain user confidence, uncover any potential issues, and make necessary adjustments before the software is deployed into production. Successful UAT indicates that the software is ready for release and can deliver the intended value to its users. Figure 17 shows the result of application features test and Figure 18 shows the result of application overall performance test.

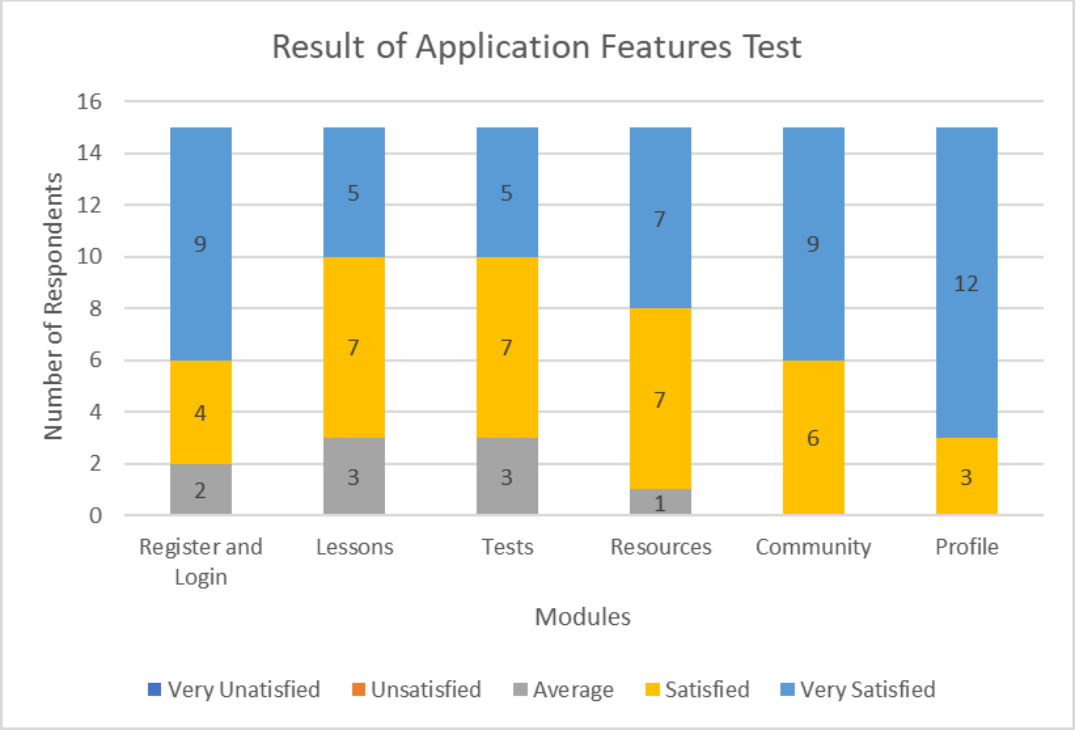

Figure 17: Result of application features test

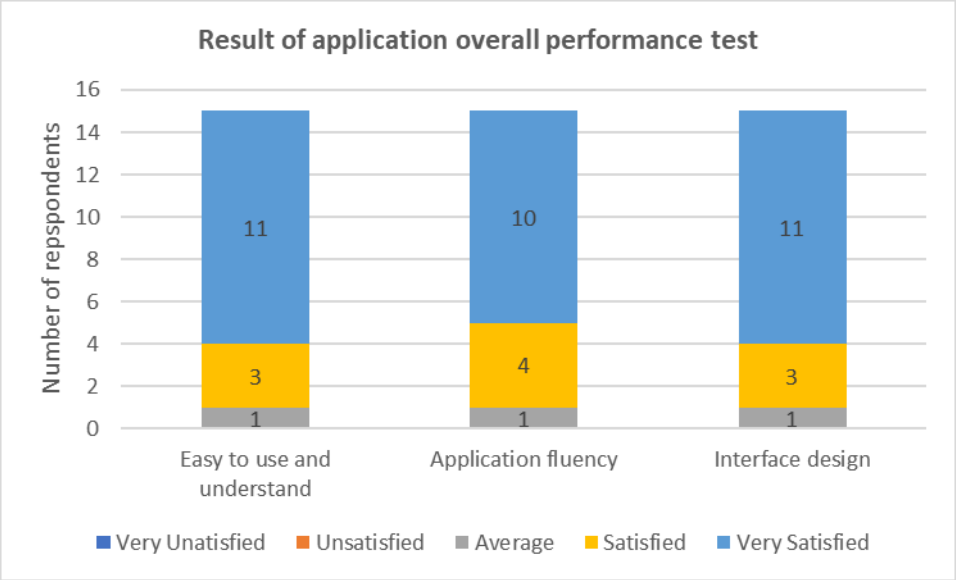

Figure 18: Result of application overall performance test

5. Conclusion

To sum up, the "Let's Benkyou" Japanese language learning application is an useful application that will helps users to obtain the knowledge on the Japanese language in a flexible and accommodating environment. The app offers beginner-friendly lessons, and users have discovered that having a community section to interact with each other enhances their productivity in learning Japanese.

In the future, improvement are hoped to be made to further increase the application's functionality, usability and availability. More and more learning resources shall be added into the application. A notification should also be implemented to remind the users to use the app regularly. Despite the existing limitations of the application, it is crucial to invest greater efforts in surpassing those constraints and enhancing its capabilities to better serve the public in the future.

Acknowledgment

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