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DEVELOPMENT SUSHQuiz: AN ANDROID-BASED JAPANESSE LANGUAGE LEARNING GAMIFICATION APPLICATION

Andina Megitha Rizkana[1,*], Vitri Tundjungsari[1]

[1]Department of Computer Science
Esa Unggul University
Jl Arjuna Utara, Jakarta Barat, Indonesia
andina.githa@gmail.com; *Corresponding author: andina.githa@gmail.com

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ABSTRACT
In second language learning, motivation is one of the main problems often faced by learners, with gamification being one of the solutions for it. SUSHQuiz is an educational application using gamification and is developed to raise motivation among many others in learning Japanese, with a focus on basic-level Japanese. The application is developed using the prototype model and Unity as the game engine. To assess potential users' views on the application, testing is held with Google Play's closed testing. Respondents are 25 people with different backgrounds who learn Japanese at a basic level. After doing the test, respondent filled out a questionnaire and SUS on their response to SUSHQuiz. The majority of respondents say the application is interesting, cute, and simple, and improves their motivation, learning habits, and knowledge of basic-level Japanese.
Keywords: Gamification; Language Learning; Educational Application; Japanese Language

1. Introduction.

Second language learning is a learning process where a person learns a language that isn't his or her mother tongue. There are several reasons for someone to pursue a second language learning, with some needing it to study in another country, wanting to integrate with the culture of the origin country, and strengthening international communication with other people who also speak that same language [1]. One of the languages often picked up for learning in Indonesia is the Japanese language, but this learning tends to not go smoothly due to internal or external obstacles. On the internal side, the learner can feel a lack of motivation, lack of interest, and lack of attitude [2].

One way to approach a lack of motivation is by using gamification. Gamification itself is the application of a game in the context of a non-gaming situation to improve community engagement with systems that support learning, such as individual learning, collaboration, learning content management, learning activity management, and formal or informal learning [3]. Elements present in gamification include conflict, action language, immersion, rules or goals, environment, game fiction, human interaction, assessment, and control, all as a way to facilitate learning itself. But it's not a comprehensive list, and instead, game elements that are considered helpful in improving learning [4]. With an entertaining learning method, improvement in learning and motivation can be seen even within one week [5].

Based on a study [6] conducted by Nisa, Waworuntu, and Luma with developing gamification for learning in the form of a web application with a focus on learning vocabulary, users are found to have interesting and effective learning while also encouraging them to use the application for an extended period. Tamara and Shishido in [7] also show gamification theory can improve both motivation and scores in learning how to write *kanji*.

With prior literature in mind, a survey is conducted through Google Forms to 41 learners of the Japanese language at a basic level. Basic level Japanese is picked because it's the level most people learning a second language are familiar with. From the survey, it's found that 83% of the survey takers have trouble with consistent learning even though they're interested in the language. 47.7% struggle with not having enough time to learn, 29.5% get bored because they learn alone, and 22.7% can't stay motivated. They're also asked to do a

self-evaluation of their ability to read *hiragana*, *the* basic alphabet for the Japanese language, and 26.8% think they are 'Very Bad' at reading *hiragana* on the Likert scale with 7.3% also picking they are 'bad' at reading *hiragana*. 94% of them are interested in using gamification as a way to help improve these things with 67% of them saying they're willing to use it 5-15 minutes a day.

Therefore, SUSHQuiz is developed with gamification in mind to motivate and help users get knowledge more easily. The application is developed especially for Android for ease of access everywhere at any time, with the final aim of releasing it into the Google Play Store to expand reach to users who need it. Features in the application focus on quizzes, specifically on multiple-choice questions similar to the Japanese Language Proficiency Test or JLPT questions.

JLPT is a proficiency test for non-native speakers of the Japanese language. The exam is held in various countries including Japan as much as twice a year, with Indonesia being one of them. JLPT has five levels marked with N in front of it, namely N1 to N5. N1 and N2 require the test taker to understand the Japanese language used widely in everyday life, N4 and N5 measure the test takers' understanding of basic languages learned in class, and N3 is the bridging level between the two.

The test only focuses on multiple-choice questions, divided into reading and listening, with specific categories of questions differing between levels. For N5, the reading part of the test presents the test taker with reading and understanding expressions and sentences in *hiragana*, *katakana*, and basic *kanji*. Meanwhile, the listening portion requires test takers to listen and understand the conversation of everyday topics and situations in a class and be able to understand important information spoken slowly [8]. JLPT is picked as the main reference and guidance for the questions as it has the role of an official proficiency test and its material is easily divided into proficiency levels.

2. **Methodology.**

This study is developed using prototype method based on Sommerville process model [9] because of its relatively fast development time and its iterative nature, making it especially fitting for a system development created to fulfill a certain purpose [10].

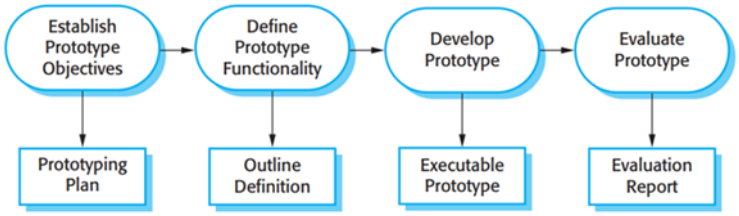

FIGURE 1. Prototype Model by Sommerville [9]

The objective of the prototype is defined based on literature studies and initial survey held with potential users. Then, requirements for the application are set, from software used to gamification it will be implemented with.

As the application is meant to be uploaded into Google Play for wider reach, evaluation for the prototype is held by testing through potential users. The test is held for a week alongside Google Play closed testing, a required testing before an application can enter the production stage, where a minimum of 20 testers use an application for at least two weeks before the developer can submit a questionnaire and decide if the application is suitable enough for production.

While testing, users can give input through the review on Google Play, email, or social media. Alongside the input, users' responses from the first week of closed testing are then collected using a mix of open questionnaires and system usability testing. The open questionnaire questions are translated as such:

TABLE 1. Open Questionnaire

Question
Do you think SUSHQuiz helps you learn basic level Japanese language? If you answer yes, please elaborate.

Do you think SUSHQuiz helps motivate you to learn the basic level Japanese language? If you answer yes, please elaborate.
Do you think your knowledge of the basic level Japanese language increases after using the application? If you answer yes, please elaborate.
From 1 to 5, how good are you at reading hiragana *after using SUSHQuiz to supplement your learning?*
In your opinion, does SUSHQuiz help you learn basic level Japanese language more consistently?
What is your impression of SUSHQuiz?
What are the advantages or features you like from SUSHQuiz?
What are the disadvantages or features you'd like to be added to SUSHQuiz?

Aside from question number four which takes answers in numbers 1 to 5 on a Likert scale where 1 means 'Very bad' and 5 means 'Very good', the questions are open-ended which means respondents can answer freely with the questions focusing on users' experiences and thoughts on application.

System Usability Testing or SUS is one of many ways to assess a product's usability and is favored for its reliability, quickness, and ease of filling in and scores with its ten statements, and can be used to evaluate any type of user interface [11]. This study uses SUS to determine if users are comfortable and can use the application easily. It uses questions that are taken verbatim from Bangor et al. modification [11] of the original as listed below.

TABLE 2. System Usability Scale Questions

Question
I think that I would like to use this product frequently.
I found the product unnecessarily complex.
I thought the product was easy to use.
I think that I would need the support of a technical person to be able to use this product.
I found the various functions in the product were well integrated.
I thought there was too much inconsistency in this product.
I imagine that most people would learn to use this product very quickly.
I found the product very awkward to use.
I felt very confident using the product.
I needed to learn a lot of things before I could get going with this product.

Questions are answered by picking answers in the range of 1-5 on a Likert scale, between 'Strongly Disagree' to 'Strongly Agree'. Counting the result differs from odd and even numbers. For odd numbers, the respondents' answer is subtracted by one, while for even numbers the respondents' answer is subtracted from 5. The final number of each question is added up and multiplied by 2.5, and the results will be between 0 to 100 [12]. It can also be seen in a comparative grade scale or adjective ratings.

3. **Results and Discussion.**

After establishing the objective of the application, the design, application name, gamification concepts, and details of the system are created. Designs are made using Figma before being fleshed out in Unity as the main engine used and Firebase SDK as the database. Visualization of the relationship between the user and the system in the application can be seen with the use case composed below.

FIGURE 2. Use Case Diagram of SUSHQuiz

Aside from using quizzes as the main activity of the application, other gamification features available in SUSHQuiz are:

1. Reward can be found in any form of thing given to the user because of success or as a praise for an action, intended to reinforce the behavior to achieve more rewards [13]. Reward in SUSHQuiz is available in the form of an illustration of a gift such as a plush, notebook, clear file, or keychain that is tradable using points obtainable by doing quizzes. Reward is implemented in the exchange point screen.
2. Point is usually rewarded after an interaction that can take the form of an experience point, redeemable point, and reputation point [14]. In SUSHQuiz, there are two types of points. Score or *skor*, obtained when picking the correct answer when playing quizzes, and point or *point* that works as a currency to exchange rewards in the exchange point screen with its quantity gained is equivalent to the score obtained when answering quizzes correctly.
3. Leaderboard shows the performance of the user compared with other users with rankings and scores. This gives challenges, goals, and assessments which are viewed as important in [15]. In SUSHQuiz, the leaderboard shows the highest score achieved by the user in one session. It's sorted by the highest score first with the user's personal best visible at the bottom of the leaderboard screen.

The questions are a mix of vocabulary, listening, and reading questions based on JLPT N5 questions and learning material. Each correct question will add 50 to both score and points and all is added up when the timer of 5 minutes for the session is up.

The registration and login page is the first page the user will see upon opening the application, with the choice to register an account, log in to an existing account, and reset the password.

FIGURE 3. Opening Screen of SUSHQuiz

In the main menu, the user can pick to play a quiz, see the leaderboard, or exchange points. The current level available is only N5, with the other level saying ‘Coming Soon’ when clicked.

FIGURE 4. Main Menu of SUSHQuiz

On the exchange point screen, user can exchange their earned point with various things differently priced based on their value, with them being illustrations to be an example.

FIGURE 5. Exchange Point Screen of SUSHQuiz

By using the leaderboard, user can see their score on the bottom part while the ranking shows users based on their score, sorted from the highest.

FIGURE 6. Leaderboard of SUSHQuiz

The quiz screen shows the question and the multiple choices of answers below, with picking the correct

answer and adding a score to the counter near the top right. The figure below shows one of the vocabulary questions.

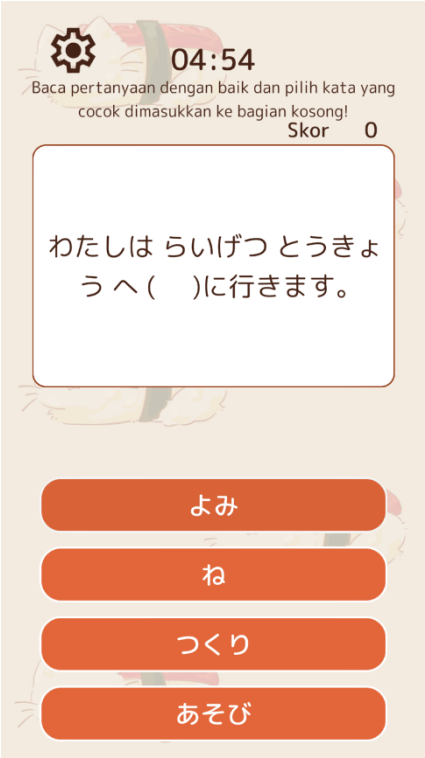

FIGURE 7. Quiz Screen of SUSHQuiz

After the application is developed and uploaded for closed testing, the 41 people who filled out the first survey are contacted again. 25 people agreed to test the application, with 4 people unable to continue due to trouble with phone compatibility for installation, while the rest didn't respond to requests for application testing. Users can send their reviews about the current test through Google Play review, email, or social media where they're contacted.

From the open questionnaire's questions, users are first asked if SUSHQuiz helped in learn basic level Japanese. 88% answered that the application helped, 2 answered that it only helps if someone already has basic knowledge of the language, and 1 user answered he or she doesn't have a strong opinion on it.

The second question asks if the application increases their motivation to learn basic Japanese. 88% answered that SUSHQuiz helps, 8% answered that they don't feel that much difference and 4% answered no because he or she can't allocate time to use the application.

The next question asks if the user's basic Japanese language knowledge increases after using SUSHQuiz, with 80% answering yes, 8% saying they don't feel that much of a difference, and 12% feeling the application doesn't help add new knowledge.

After using the application, none of the users now answered that their *hiragana* reading ability is 'very bad' compared to the first survey, with 44% measuring their aptitude at 3 out of 5 or 'neutral'.

Then, the users are asked if using the application makes their learning more consistent. 92% answered that SUSHQuiz helps make their learning more scheduled, while 4% don't have any strong opinion, and 4% answered that the application doesn't help in learning more consistently.

When asked what the users' impression of SUSHQuiz is, the words that show up are the application design is good, it has an interesting concept, simple, cute, and easy to use. Some users say the application is fun but there is not enough learning material yet and no answer explanation after each question.

Then the users are asked about what they think the advantages or features they like from SUSHQuiz are, users mostly respond by mentioning the gamification aspects such as the score, point, reward exchange, interactivity, structured questions, and leaderboard. Users also like the cute and simple design with lightweight application size, and how the application helps boost motivation.

Next, users answer the disadvantages or features they want to be added to SUSHQuiz. Some answers include options for not looping answers, way of using the reward gained from exchanging points, adding more illustrations, explanation after answering a question, fixes so the application doesn't crash, and a system so users can't brute force by tapping certain answers to get the correct one.

Users also fill in the System Usability Testing questions with answers listed down below.

TABLE 3. System Usability Scale Answers

Respondent	*Q1*	*Q2*	*Q3*	*Q4*	*Q5*	*Q6*	*Q7*	*Q8*	*Q9*	*Q10*	*Total*
R1	*3*	*3*	*4*	*2*	*3*	*3*	*4*	*2*	*3*	*1*	*65*
R2	*4*	*1*	*5*	*1*	*2*	*1*	*5*	*1*	*4*	*1*	*87.5*
R3	*4*	*2*	*4*	*3*	*3*	*1*	*4*	*1*	*4*	*1*	*77.5*
R4	*2*	*5*	*2*	*5*	*3*	*3*	*4*	*4*	*2*	*4*	*30*
R5	*5*	*1*	*5*	*1*	*5*	*1*	*5*	*1*	*5*	*1*	*100*
R6	*4*	*2*	*4*	*3*	*4*	*2*	*4*	*2*	*4*	*2*	*72.5*
R7	*3*	*1*	*5*	*1*	*4*	*2*	*4*	*1*	*4*	*2*	*82.5*
R8	*3*	*2*	*4*	*1*	*4*	*2*	*4*	*2*	*4*	*2*	*75*
R9	*4*	*1*	*5*	*5*	*5*	*2*	*4*	*1*	*5*	*1*	*82.5*
R10	*3*	*1*	*5*	*1*	*5*	*3*	*5*	*1*	*5*	*1*	*90*
R11	*4*	*1*	*5*	*1*	*4*	*2*	*5*	*1*	*5*	*2*	*90*
R12	*4*	*3*	*4*	*3*	*4*	*3*	*2*	*3*	*3*	*5*	*50*
R13	*3*	*1*	*5*	*3*	*5*	*3*	*5*	*1*	*5*	*4*	*77.5*
R14	*5*	*2*	*4*	*3*	*5*	*1*	*3*	*2*	*4*	*3*	*75*
R15	*3*	*1*	*5*	*1*	*4*	*2*	*4*	*1*	*5*	*2*	*85*
R16	*4*	*3*	*3*	*3*	*4*	*2*	*4*	*2*	*4*	*3*	*65*
R17	*3*	*3*	*4*	*2*	*4*	*3*	*3*	*2*	*3*	*3*	*60*
R18	*3*	*3*	*4*	*4*	*4*	*2*	*4*	*4*	*2*	*2*	*55*
R19	*3*	*3*	*2*	*3*	*3*	*3*	*3*	*2*	*2*	*2*	*50*
R20	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*50*
R21	*4*	*1*	*4*	*3*	*4*	*2*	*4*	*1*	*4*	*4*	*72.5*
R22	*4*	*2*	*5*	*1*	*4*	*2*	*4*	*1*	*4*	*1*	*85*
R23	*4*	*1*	*4*	*1*	*4*	*1*	*1*	*1*	*5*	*2*	*80*
R24	*3*	*3*	*3*	*2*	*3*	*2*	*3*	*2*	*2*	*3*	*55*
R25	*4*	*2*	*4*	*2*	*4*	*3*	*4*	*2*	*4*	*3*	*70*
Average score											*71.3*

The final SUS score from all 25 respondents is 71.3 which falls under the C in grade scale and good in adjective rank [11].

4. **Conclusions.**

SUSHQuiz is developed based on prior literature and problems faced by users with a focus on using gamification to help. Based on users' questionnaire answers, most perceive SUSHQuiz as being useful to their learning of the basic Japanese language. Users' view of their ability becomes more positive and they like the gamification features, seeing it as an advantage of the application. From the final survey, it's also concluded that gamification helps users in terms of motivation as well as improving knowledge.

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