Developing PvP Menu of E-Learning System for Learning Japanese

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1. Introduction

Students who do not use kanji in their native language have difficulty in learning Japanese [1] [2]. The cause is mainly because the writing and reading system of kanji and their native languages are different [1]. Learning kanji is even harder because there each kanji has several meanings and readings [3]. There are also a lot of kanjis to be learnt, the required *jōyō* kanji count is 2,316 as of 2010 [4]. Therefore, kanji acquisition is hard for foreign students [1] [2].

For the aforementioned problem in learning kanji, the development of e-learning system for learning Japanese was proposed. The system includes a pattern recognition so that the user can practice handwriting kanji. Gamification is also implemented to increase users' participation and motivation by implementing game elements, such as points, reward system and social elements.

This paper will explain about the development of the social elements part of gamification theory, which is the player vs player (PvP) menu. In the PvP menu, the user can play against another user in answering quizzes about Japanese kanji and vocabulary. By doing so, the user can accumulate points which determine who will win the match.

Lastly, future work will be discussed. This includes the evaluation part of the e-learning system which will be based on ARCS model.

2. Previous Development

2.1 E-Learning System

The e-learning system for learning Japanese was developed with pattern recognition for recognizing Japanese characters handwriting and implemented gamification theory to increase users' participation and motivation. The e-learning system is being developed for smartphones with operating system Android and iOS.

2.2 Gamification Theory

Gamification theory can increase users' participation and motivation by combining game elements and game thinking in activities that are not games [5] [6]. The game elements that are used in gamification theory are described in Table 1.

No.	Game Elements	Description
1.	Points	Numeric accumulation based on certain activities.
2.	Badges	Visual representation of achievements for the use shown online.
3.	Leaderboards	How the players are ranked based on success.
4.	Progress bars/Progression	Shows the status of a player.
5.	Performance graph	Shows player performance.
6.	Quests	Some of the tasks players have to fulfill in a game.
7.	Levels	A section or part of the game
8.	Avatars	Visual representation of a player or alter ego.
9.	Social elements	Relationships with other user through the game.
10.	Rewards/reward system	System to motivate players that accomplish a quest.

Table 1. Game Elements [6]

Using gamification theory in activities and processes, the users' commitment and motivation will increase [5]. According to Huang and Soman, gamification affects students' behavior, commitment and motivation which in turn will improve knowledge and skills as cited by [5].

2.3 System Development

The e-learning system consists of three primary learning menus, which are the Kanji, Vocabulary and Sentence menu. The Word List menu saves user's favorite words. The PvP menu is where the user can battle another user in a quiz. The menus are shown on Figure 1 with the matching game elements based on gamification theory on Table 1. The fifth game element, performance graph, is not shown as it is part of the profile screen.
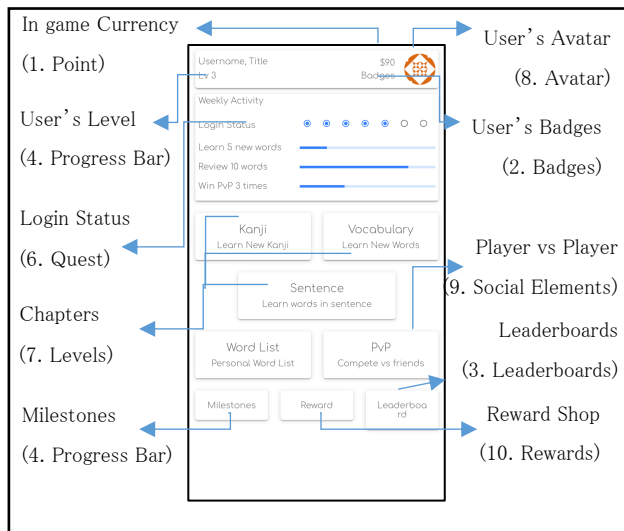

Figure 1. Main Menu and Game Elements

The Kanji menu provides learning material for individual kanji. The Vocabulary menu provides learning material for Japanese words. The Sentence menu is how to use the words from Vocabulary menu in a sentence. The menu chapter screen is shown in Figure 2.
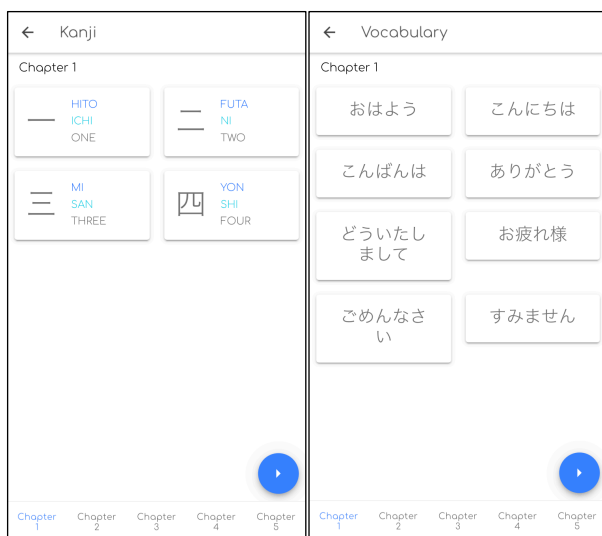

Figure 2. Kanji and Vocabulary Menu Chapter Screen

In the primary learning menus, there is a canvas in the middle of the screen to practice handwriting. The handwriting in the canvas will be sent to the server to be evaluated whether it is correct or incorrect. The preview of canvas in Kanji Menu is shown on Figure 3.
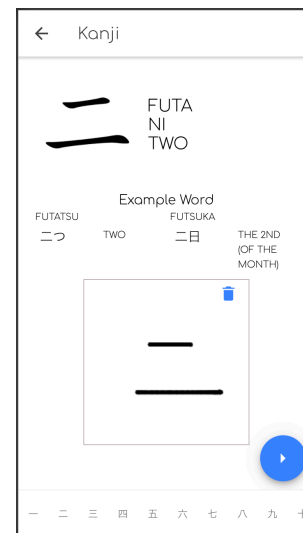

Figure 3. Practice Screen

3. Player Vs Player Menu (PvP)

3.1 What is PvP?

Player vs Player (PvP) menu enables the user to play against another user. By answering the questions correctly, the user can accumulate points. More points will be awarded for faster answer. The user with more points than the opponent will win the match.

The PvP menu was developed in regard to gamification theory game element, the social elements. This feature allows the user to interact with other user in quiz format. This is in line [5] that stated by implementing game techniques and mechanism in learning, it is hoped that the students engage in a friendly competitive environment with other students.

3.2 PvP Menu Development

The PvP menu is developed using socket.io and programming language javascript. By using socket.io, it allows the PvP match to be bi-directional and real-time on both users.

After choosing PvP screen, the PvP Setting Screen will appear. In this screen, the user can set the match to their own liking. Which question set to use, how many

questions in the match, and who to match against are all adjustable in this setting screen. The PvP Setting Screen is shown on Figure 4.
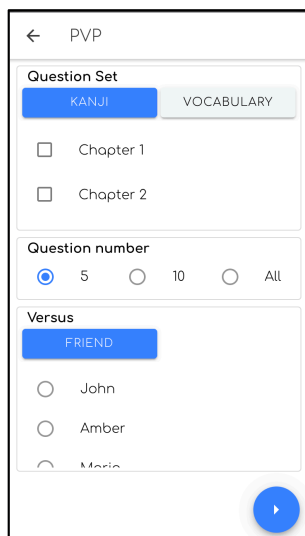

Figure 4. PvP Setting Screen Match Invitation

When the first user has chosen to start the match, the second user will receive the match invitation dialogue as shown on Figure 5 right picture. The second user may choose to accept and start the match or to reject the invitation. Before the second user answer the invitation, the first player will be on hold as shown on Figure 5 left picture.
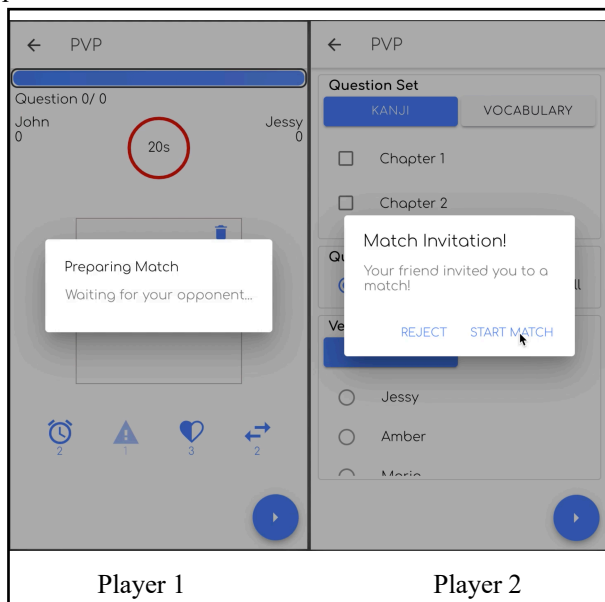

Figure 5. Match Invitation Screen

Figure 6 shows the PvP Match Screen. This screen will be displayed when the match has started. In this screen, the top bar shows the match progression, which question number is currently at and the total number of questions. Below the number of questions is a row showing the current player name and score, a timer, and the opponent's name and score. The timer is set for 20 seconds, as such the question has to be answered within 20 seconds. The faster the user answer, the higher the point that can be attained.

In the middle of the screen, there is the question and a canvas to answer. The user can answer by directly writing on the canvas and submit the answer. The system will judge whether the answer is correct or incorrect and automatically adds point the score.
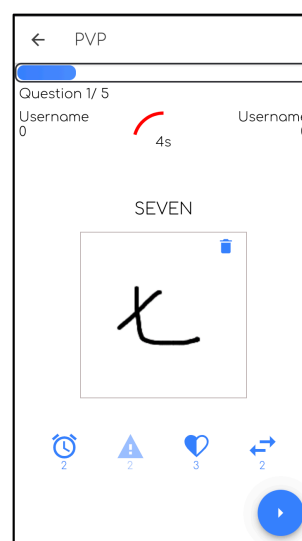

Figure 6. PvP Match Screen

The bottom part of the Match Screen is shown in Figure 7. These are the PvP items that can be used to advance the user's progress or hinder the opponent's progress. Starting from the leftmost is, Bomb, Barrier, Auto Correct, and Mirror items (the icon designs are not final). The Bomb item can be used to hide the opponent's canvas for 5 seconds. The Barrier item will be used automatically to nullify opponent's attack, provided the user has the item. The Auto Correct item can be used to make the answer automatically correct without needing to write on the canvas. The Mirror item can be used to flip the opponent's canvas vertically. All items can be purchased with points that are accumulated when using the e-learning system.

Figure 7. PvP Items

4. Summary

The development of e-learning system for learning Japanese based on gamification theory is progressing well. This paper elaborates the social elements part of gamification theory game elements, which is implemented as PvP menu in this e-learning system. The PvP menu enables the user to compete with other users in answering Japanese kanji and words related question by writing on a canvas. The PvP menu is also supplemented by four PvP items, Bomb, Barrier, Auto Correct and Mirror to enhance the experience. These four items are purchasable by collecting points when using the e-learning system.

5. Future Work

This research will be continued by completing the e-learning system development and improving the existing menus. The next step is to evaluate the e-learning system based on ARCS Model. The current proposition is to distribute a questionnaire created based on each areas of ARCS Model (Attention, Relevance, Confidence, and Satisfaction) using a 5-point Likert scale.

References

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