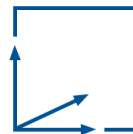


Development of a Turn-Based Battle System for a Serious Game for Learning Japanese

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Final: Bachelor Informatik: Games Engineering

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Advisor: Dr. David A. Plecher

Introduction / Motivation

- Developing a battle system for the game Dragon Tale
- Dragon Tale is a Serious Game for learning Japanese
- Utilize the state of “Flow” to help players review kanji and vocabulary in an entertaining way

Problem Description: Issues

- Trying to make a conclusion about the effectiveness of such a battle system.
- Design and implement a suitable battle system. The following issues have to be addressed:
 - How is the battle system integrated into Dragon Tale?
 - How is a battle initiated?
 - What choices does the players have in each turn?
 - How is the Japanese language included?
 - What influence does the player's Japanese knowledge have?
 - What are the possible outcomes of a battle?

Existing Solutions / Related Work

- Language learning platforms that use Gamification



Existing Solutions / Related Work

- Slime Forest Adventure [4]

[4]



Existing Solutions / Related Work

- Koe [5]

[5]



Existing Solutions / Related Work

- Learn Japanese To Survive! Kanji Combat [6]

[6]



Goals of this Thesis

- Design and develop a suitable turn-based battle system
- Let the player's Japanese knowledge influence the outcome of a battle
- Players should learn from their mistakes
- Smooth integration into Dragon Tale

Critical Research Issues

- Is a turn-based battle system suitable for learning Japanese?

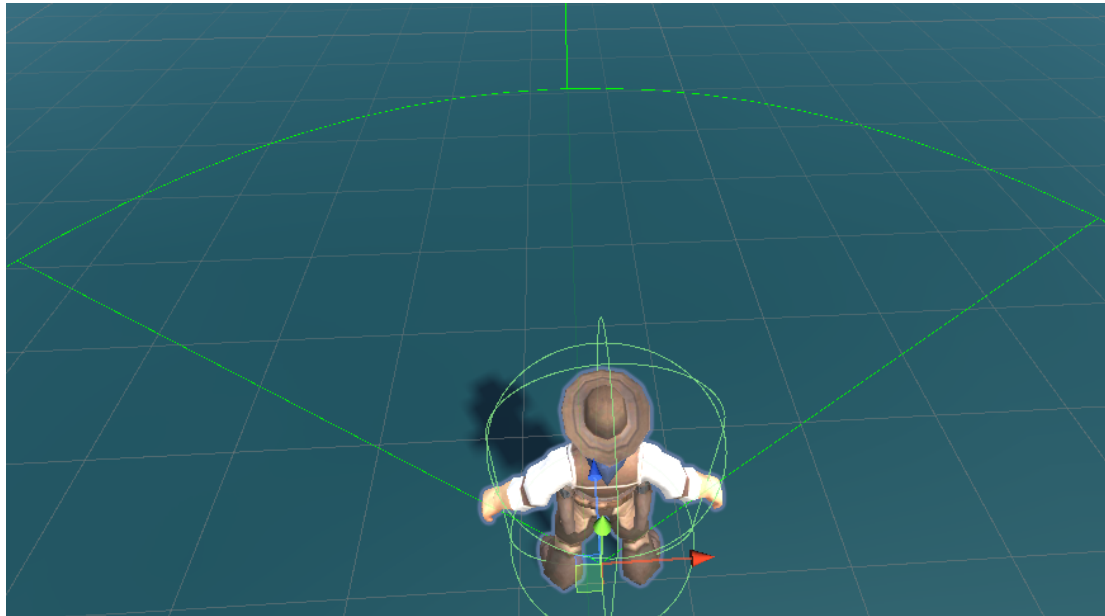
Proposed Work / Approach

- Analysis of related work
- Creation of a rough class diagram
- Implementation with the game engine Unity3D and the programming language C#
- Conducting a user study to evaluate the user interface and for gathering general feedback and suggestions
- Conclusion

Implementation

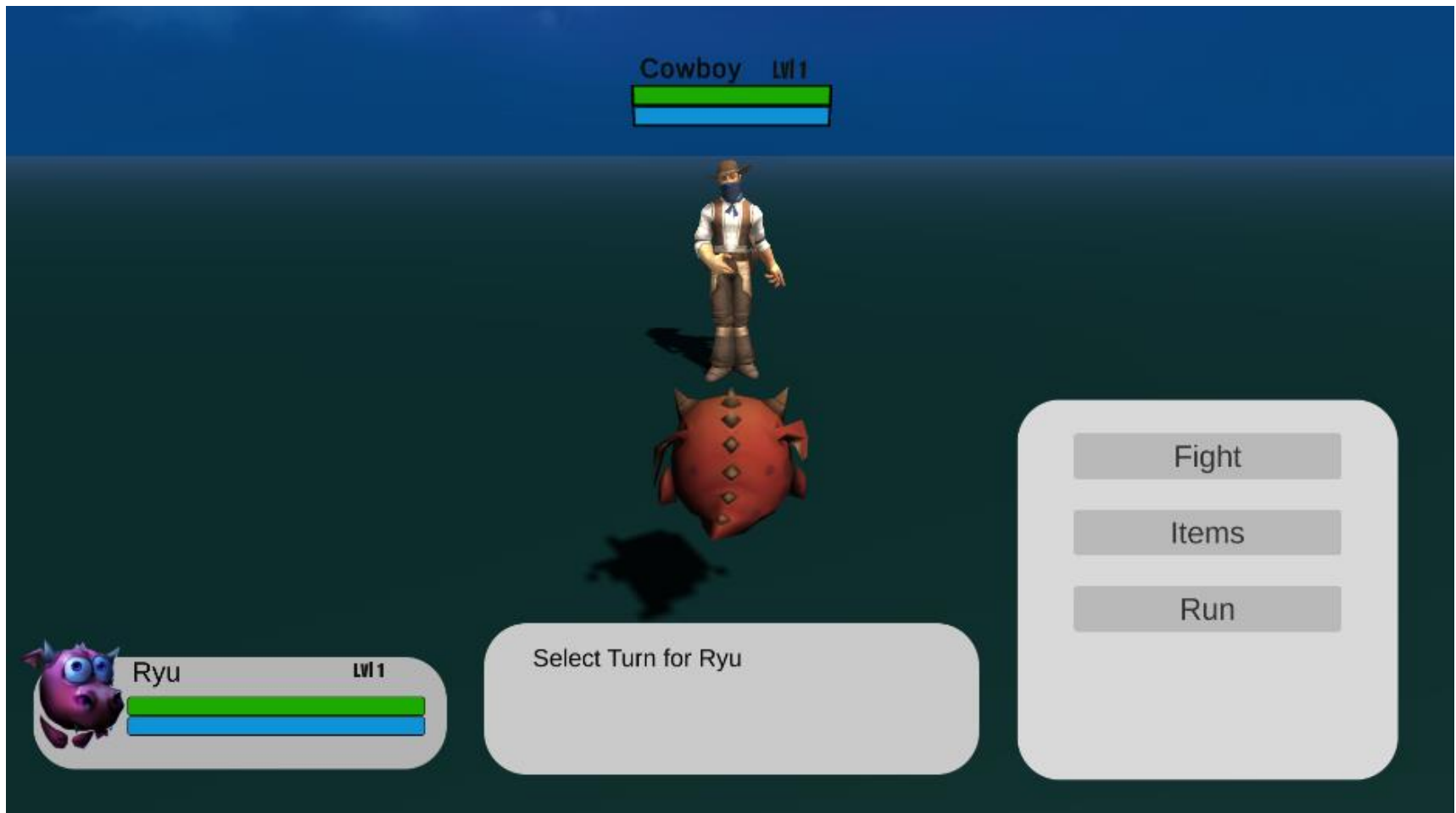
- Initiating a battle
- Battle scene
- Battle status
- Battle dialogue
- Battle menu
- Japanese tasks
- Ending of a battle

Implementation: Battle Initiation

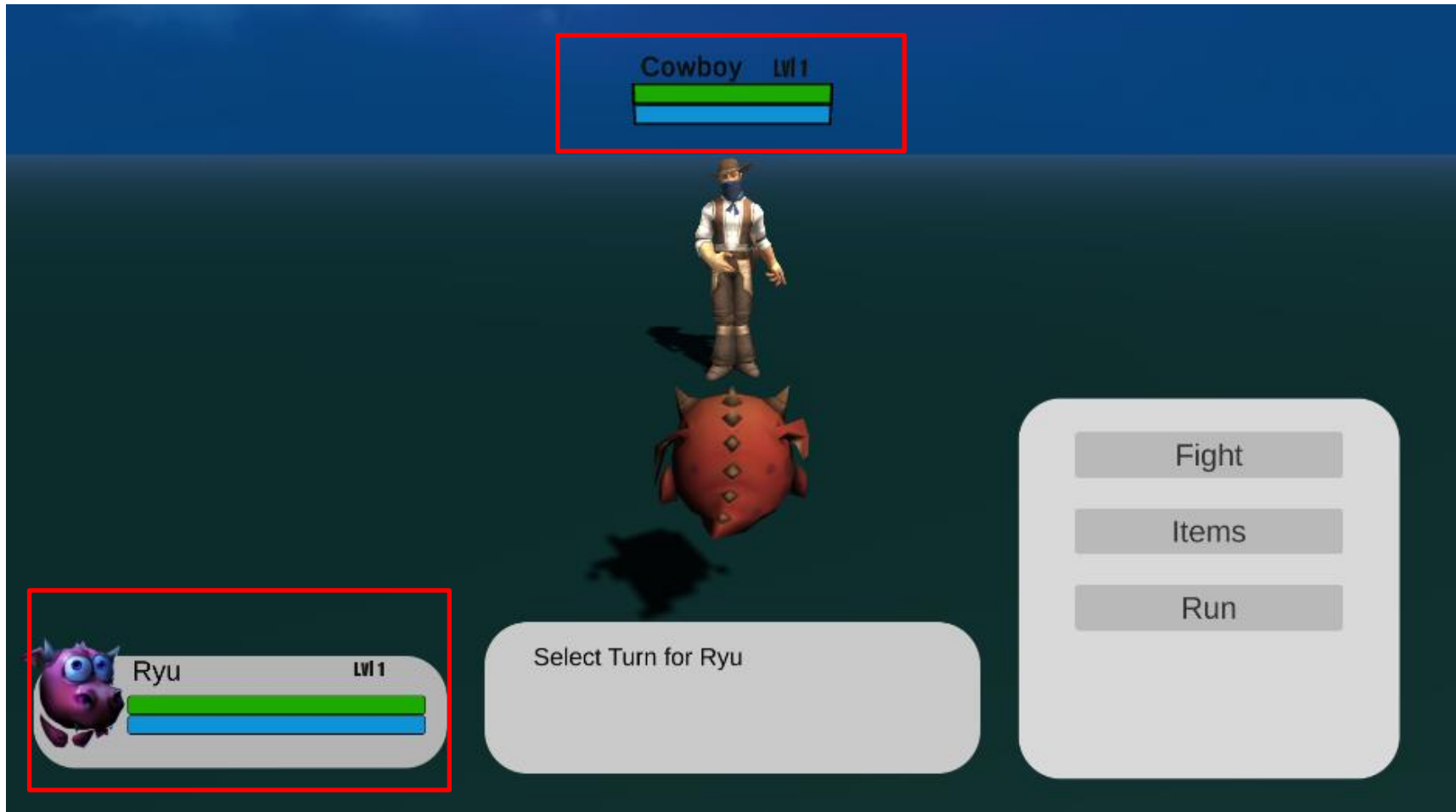


- Capsule collider for initiating a battle
- View Range + View Angle for detecting the player and chasing after him

Implementation: Battle Scene

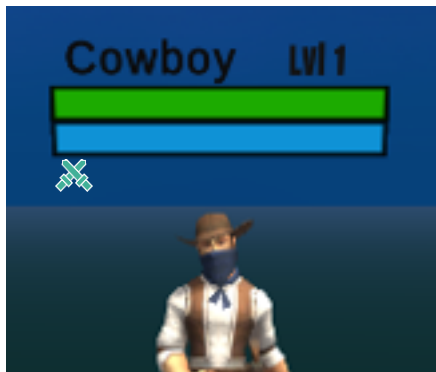


Implementation: Battle Status

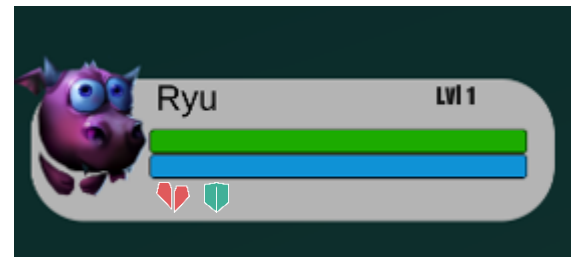


Implementation: Battle Status

Enemies

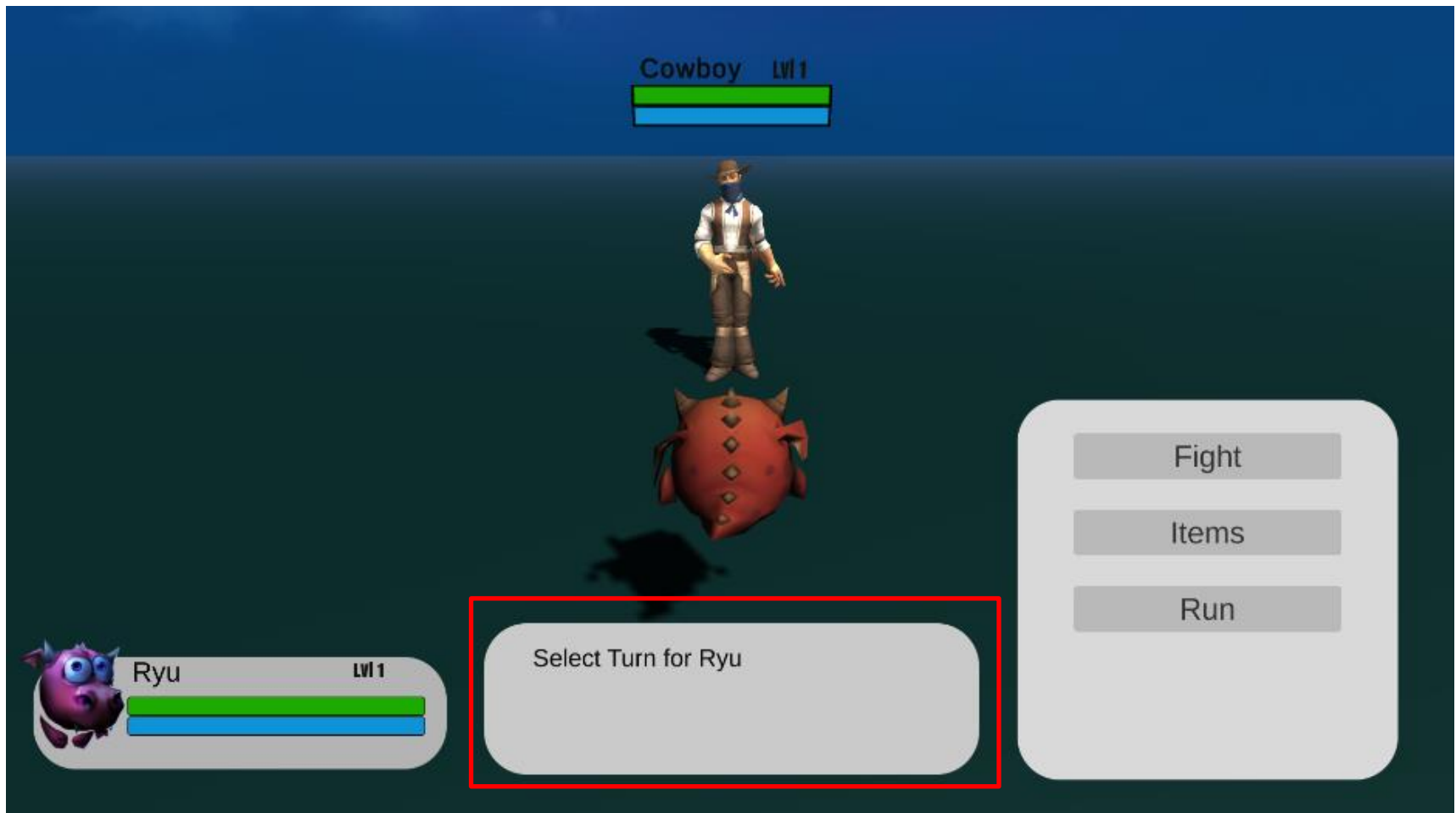


Allies

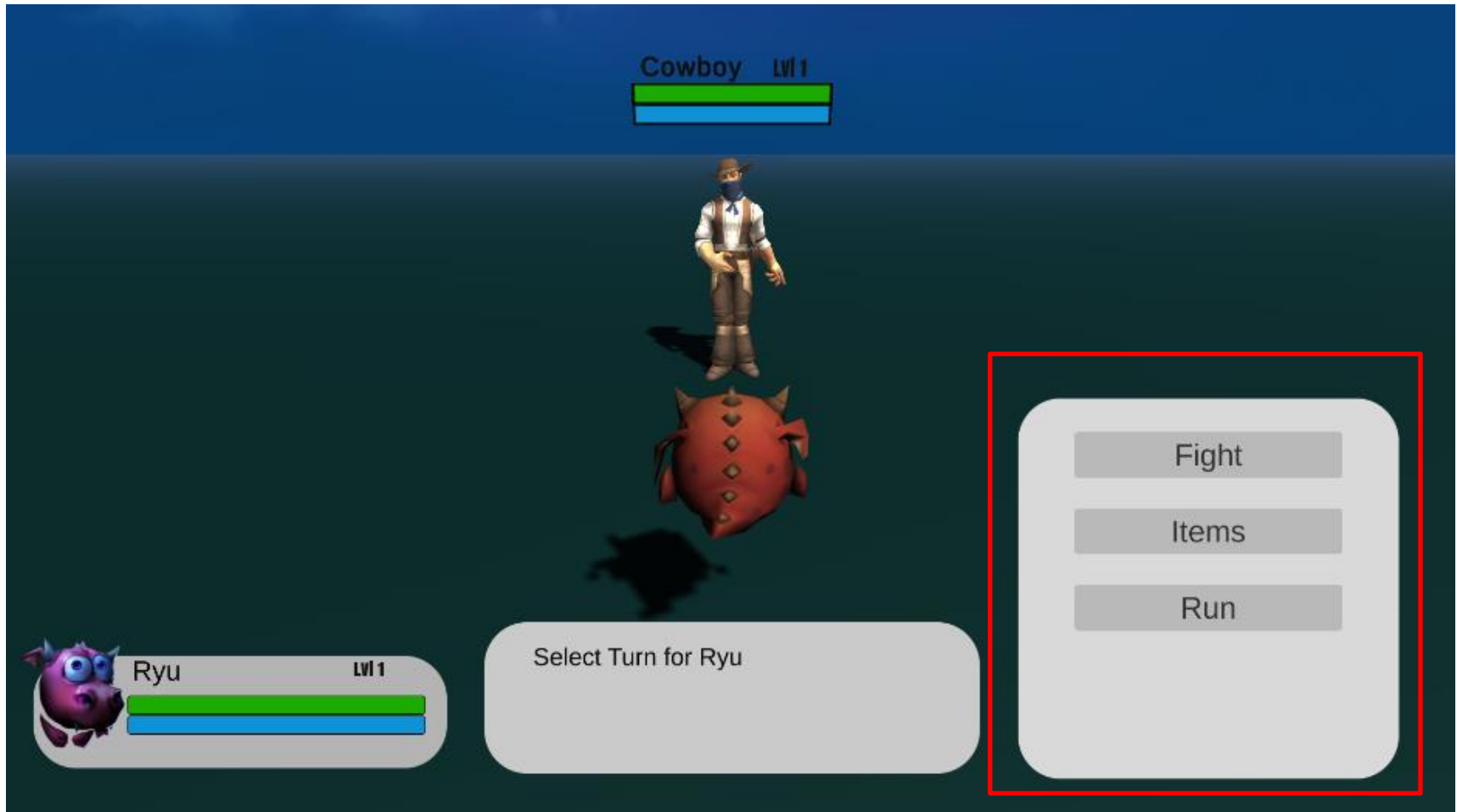


- Name + Level
- Health Points (HP)
- Skill Points (SP)
- Buffs and debuffs

Implementation: Battle Dialogue



Implementation: Battle Menu



Implementation: Battle Menu

Player selects his next move via this menu

- “Attack”: Deals a moderate amount of damage to a single target without the need of SP
- “Defend”: Defense buff for the turn executer for only one round without the need for SP
- Items and skills
- “Run”: Escape from the battle with a certain probability

The selected move has a certain battle effect type:

Damage, Healing, Buffs and Debuffs for stats, Recover and erase SP

Implementation: Japanese tasks

Task types:

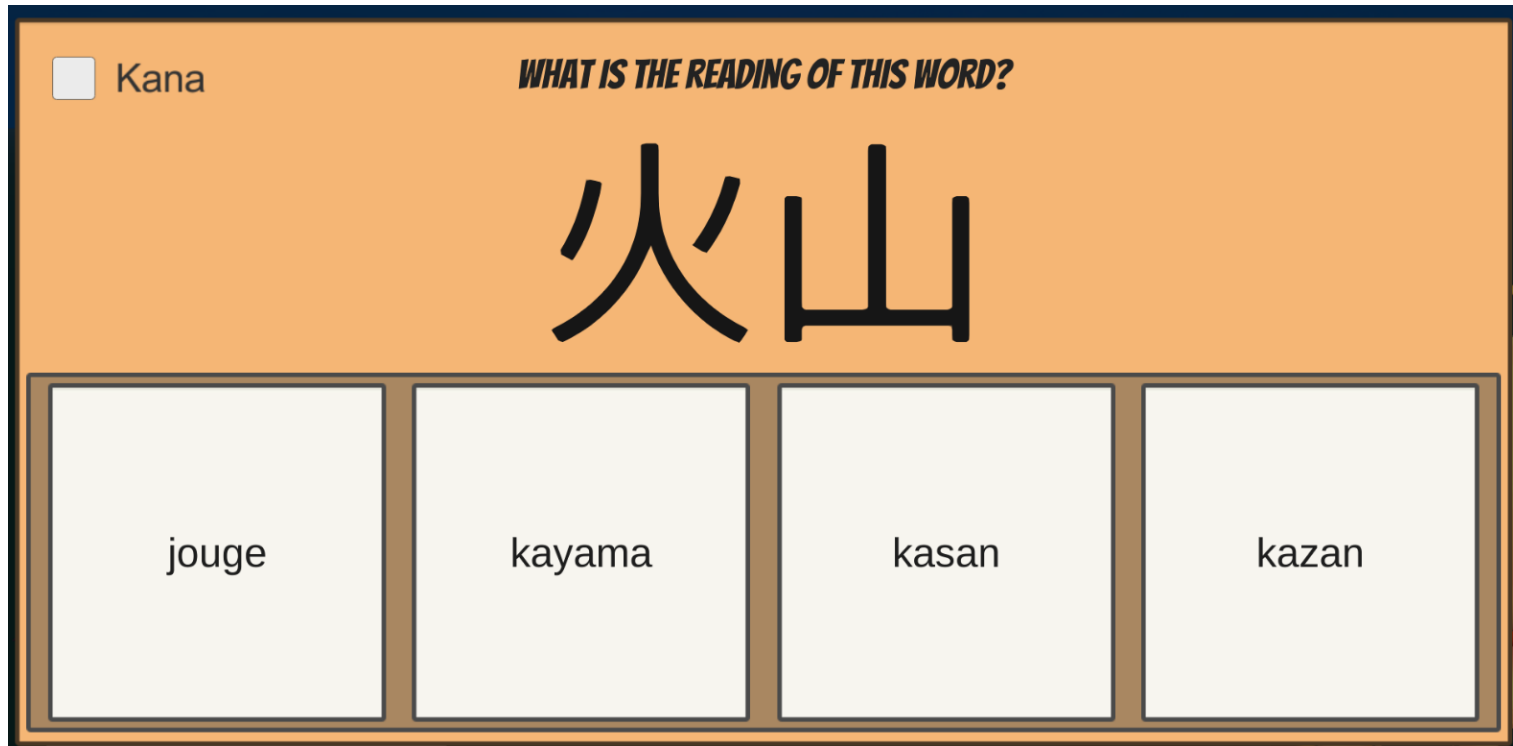
- Kanji
- Tango (Vocabulary)

	② fire
	③ Kun: <u>ひ</u> 、 <u>-び</u> 、 <u>ほ-</u>
	④ On: <u>カ</u>

Task subtypes:

- Writing (1)
- Meaning / Translation (2)
- Reading (3, 4)
- Onyomi-Reading (only for Kanji) (4)
- Kunyomi-Reading (only for Kanji) (3)

Implementation: Japanese tasks



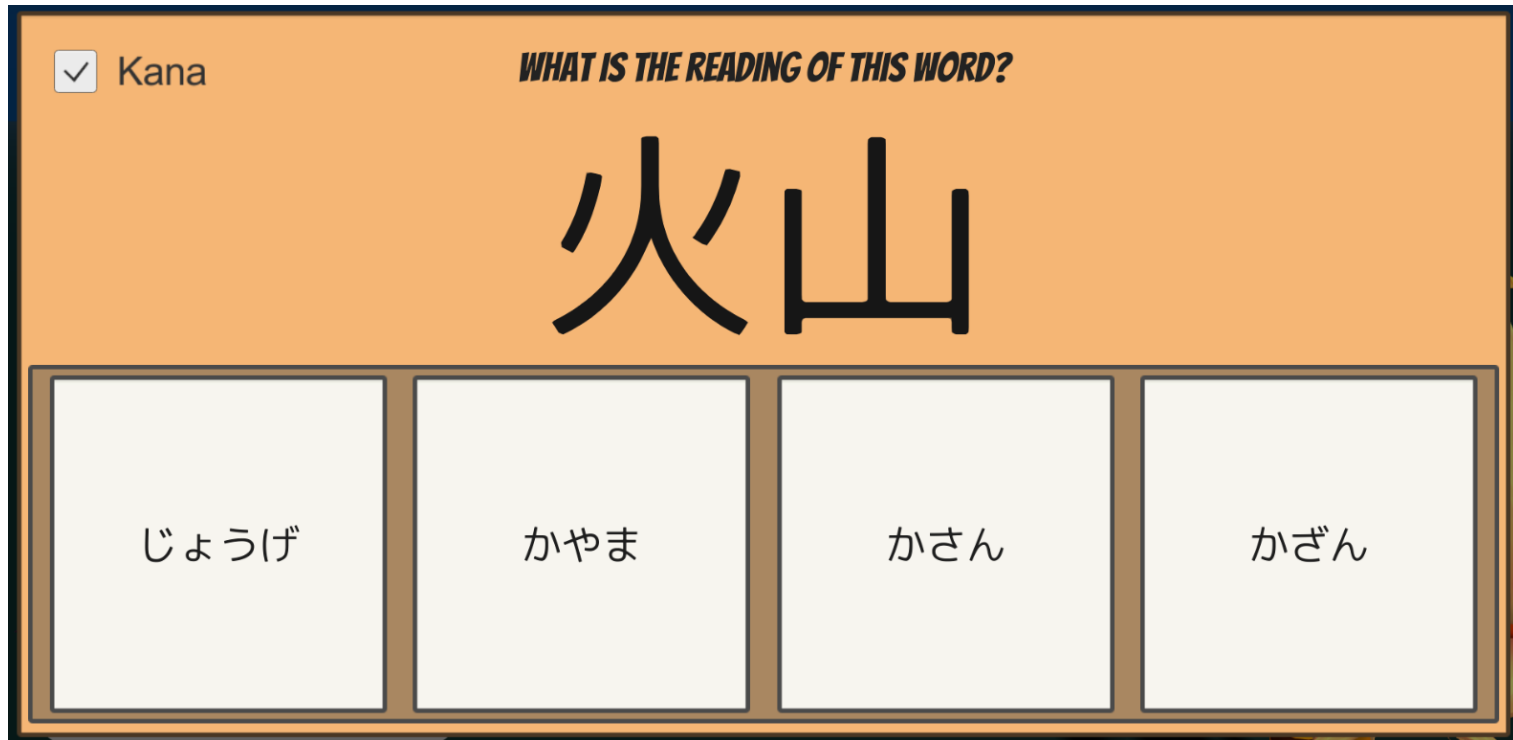
Kana

WHAT IS THE READING OF THIS WORD?

火山

jouge kayama kasan kazan

Implementation: Japanese tasks



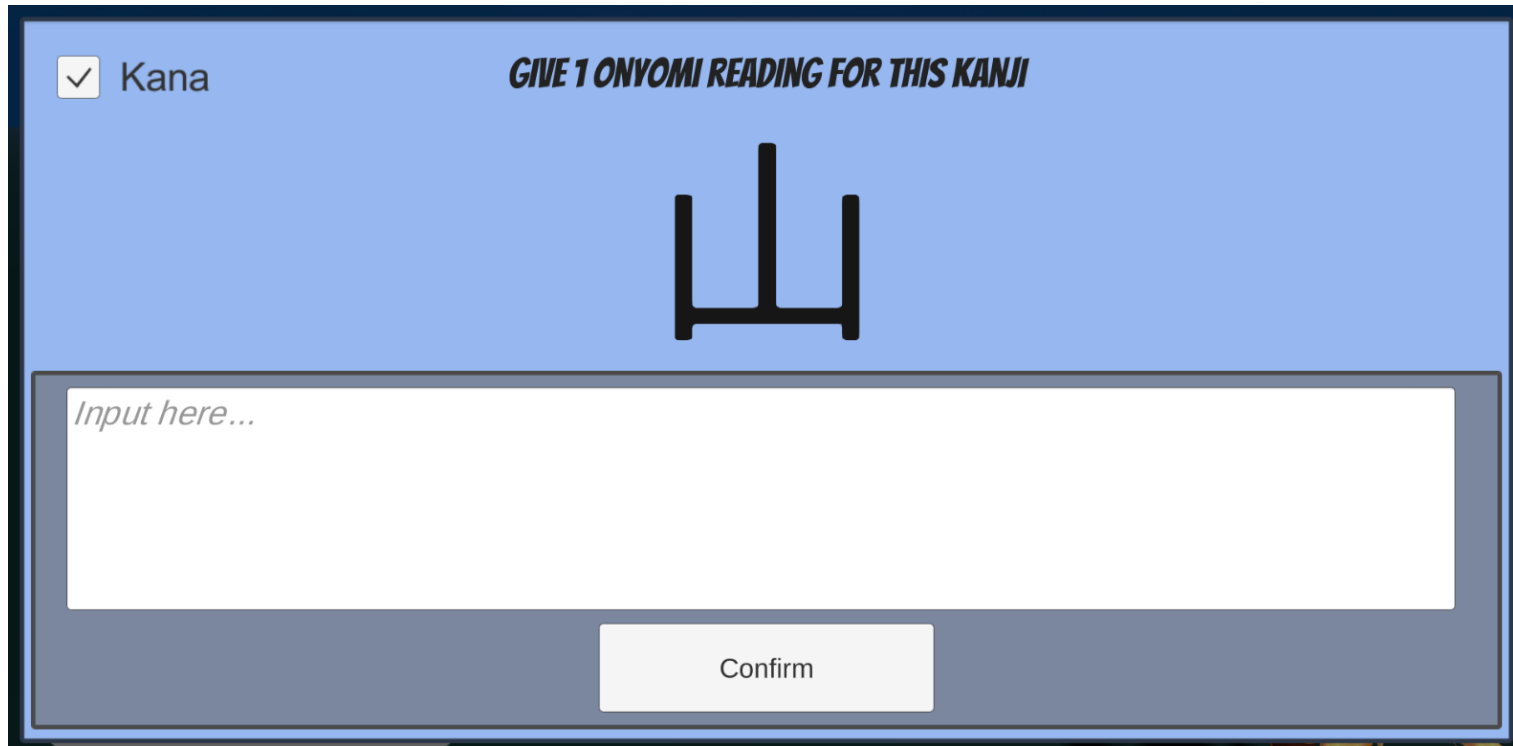
Kana

WHAT IS THE READING OF THIS WORD?

火山

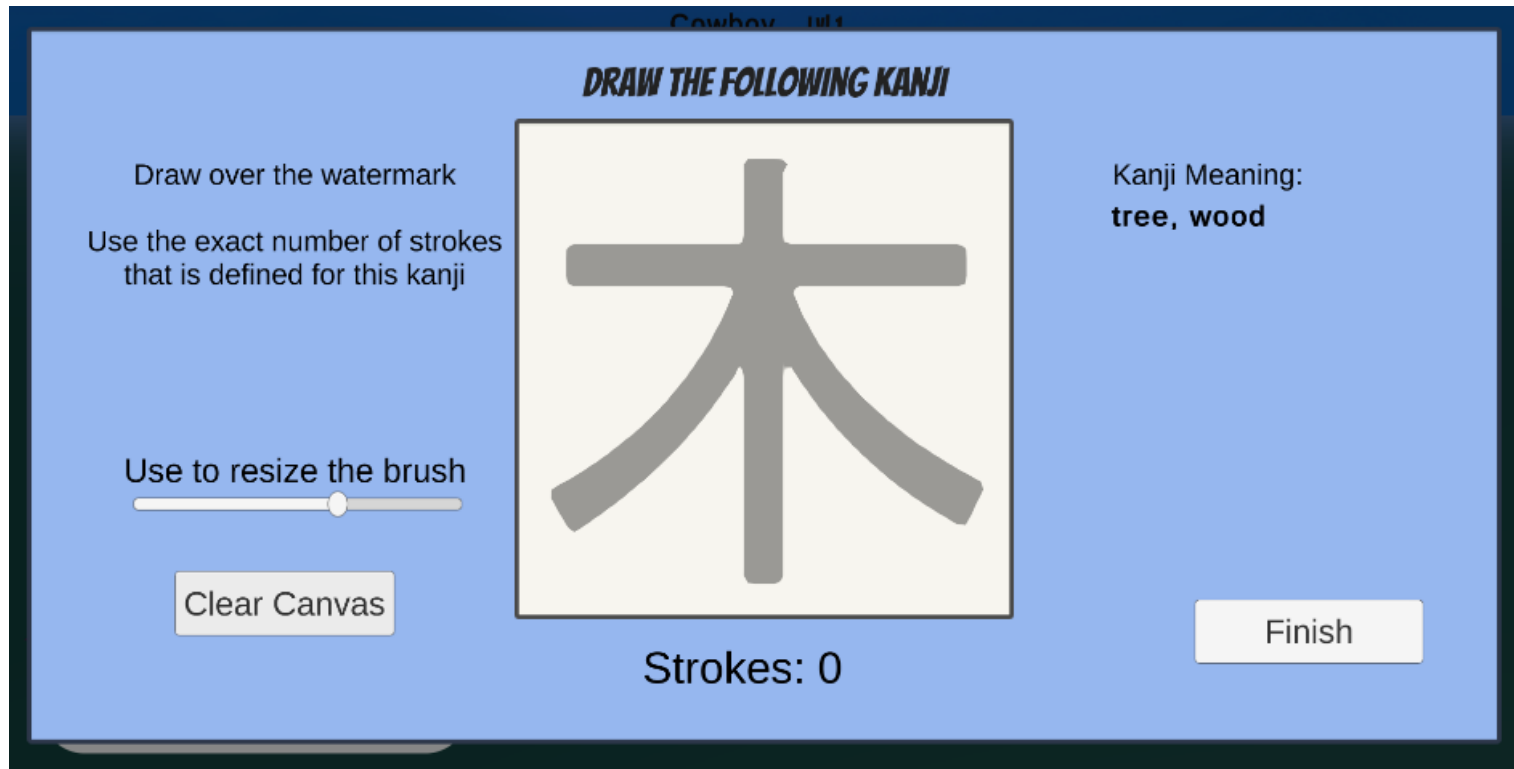
じょうげ	かやま	かさん	かざん
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Implementation: Japanese tasks



The screenshot shows a user interface for a Japanese task. At the top left, there is a checked checkbox labeled "Kana". To its right, the instruction "GIVE 1 ONYOMI READING FOR THIS KANJI" is displayed in a bold, italicized font. In the center of the interface is a large black kanji character, which is "山" (Yama). Below the kanji is a large, empty text input field with the placeholder text "Input here...". At the bottom center of the interface is a light gray button labeled "Confirm".

Implementation: Japanese tasks



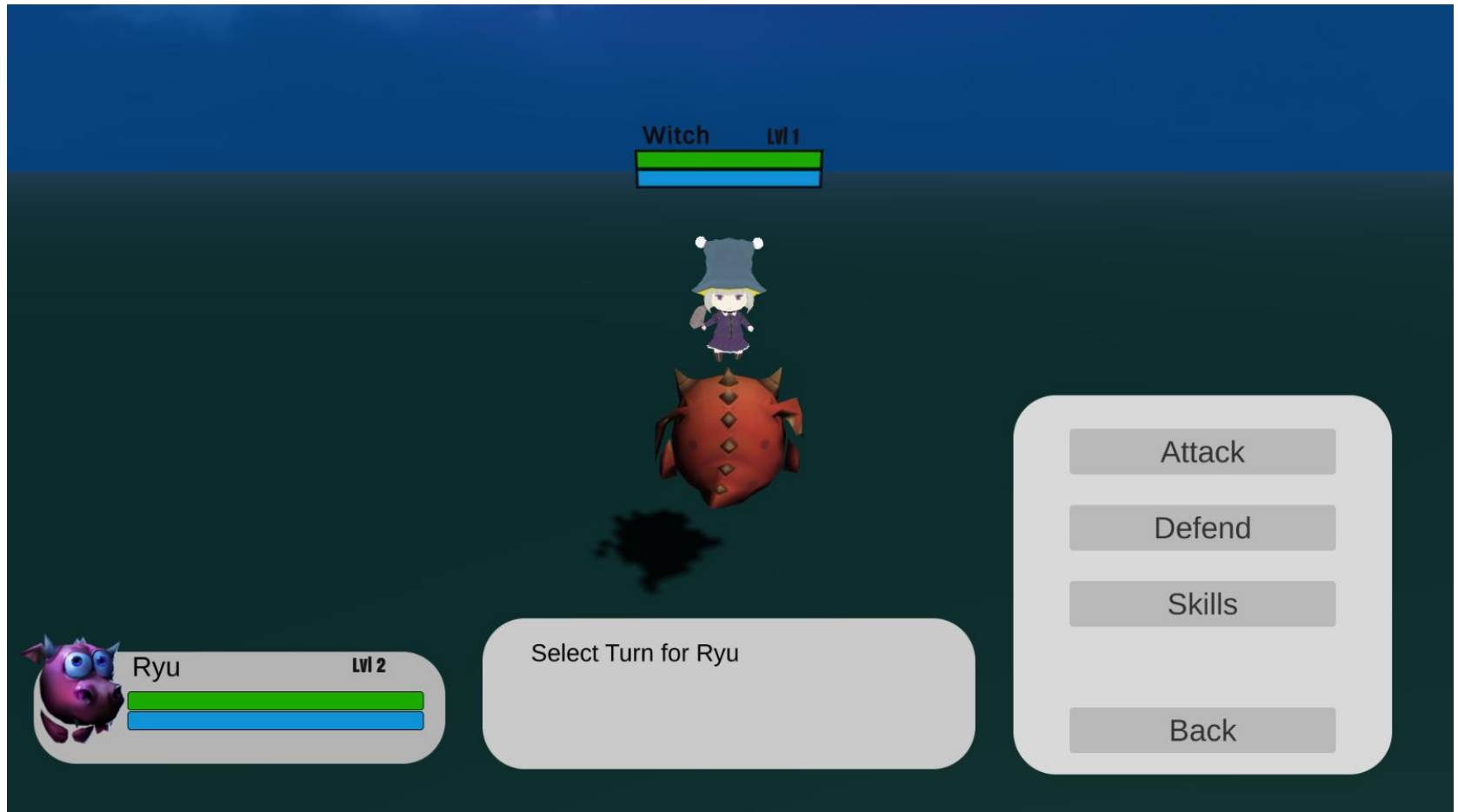
Implementation: Ending a battle

- Player wins
 - Gains exp
 - Gains loot (each enemy has a defined loot list)
 - Enemy disappears (until it respawns again)
- Enemy wins
 - Player respawns (at defined respawn point)
 - Player's allies' HP and SP restored by half
- Player escapes
 - Enemy goes into idle mode for a few seconds

Implementation



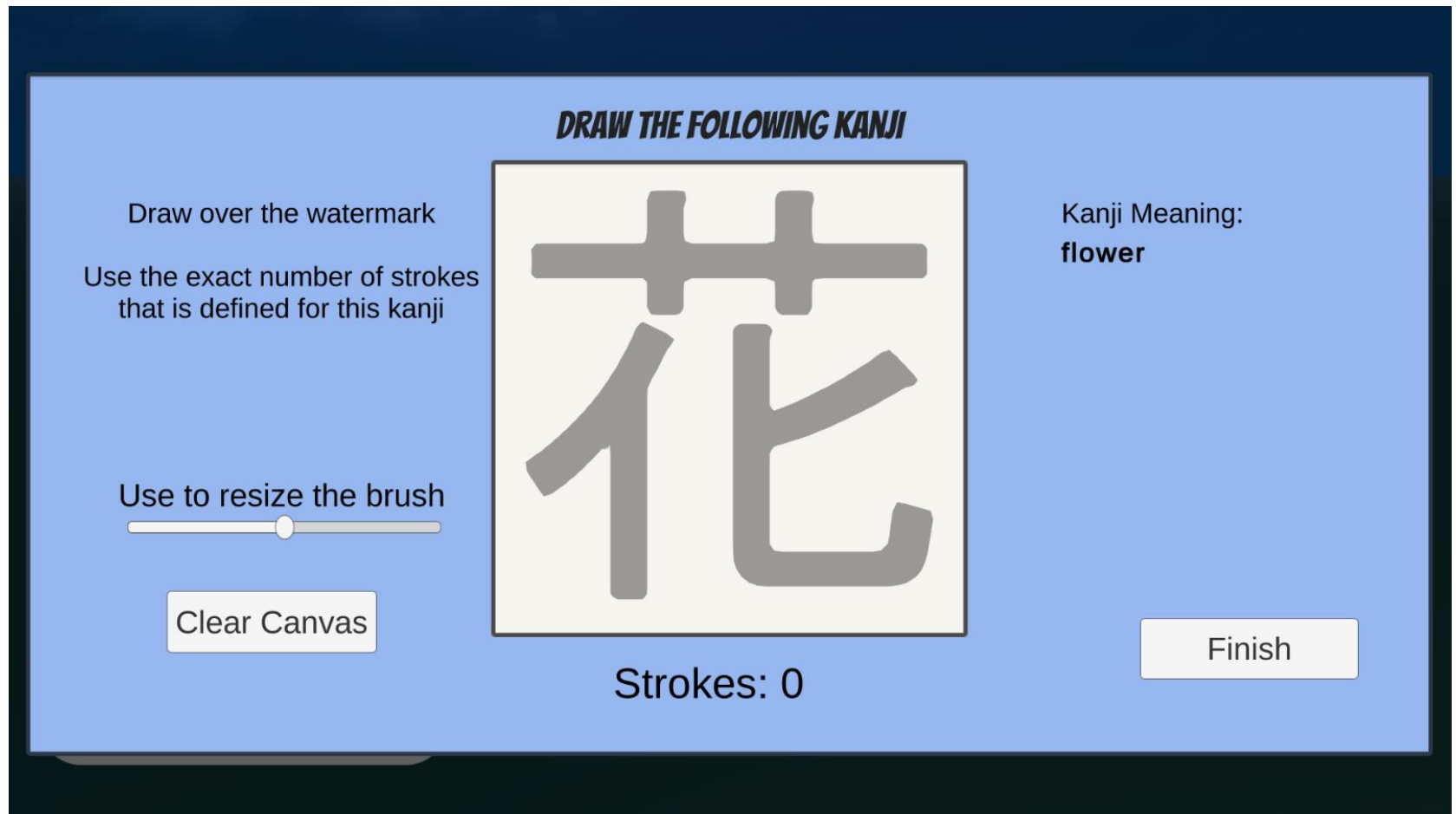
Implementation



Implementation

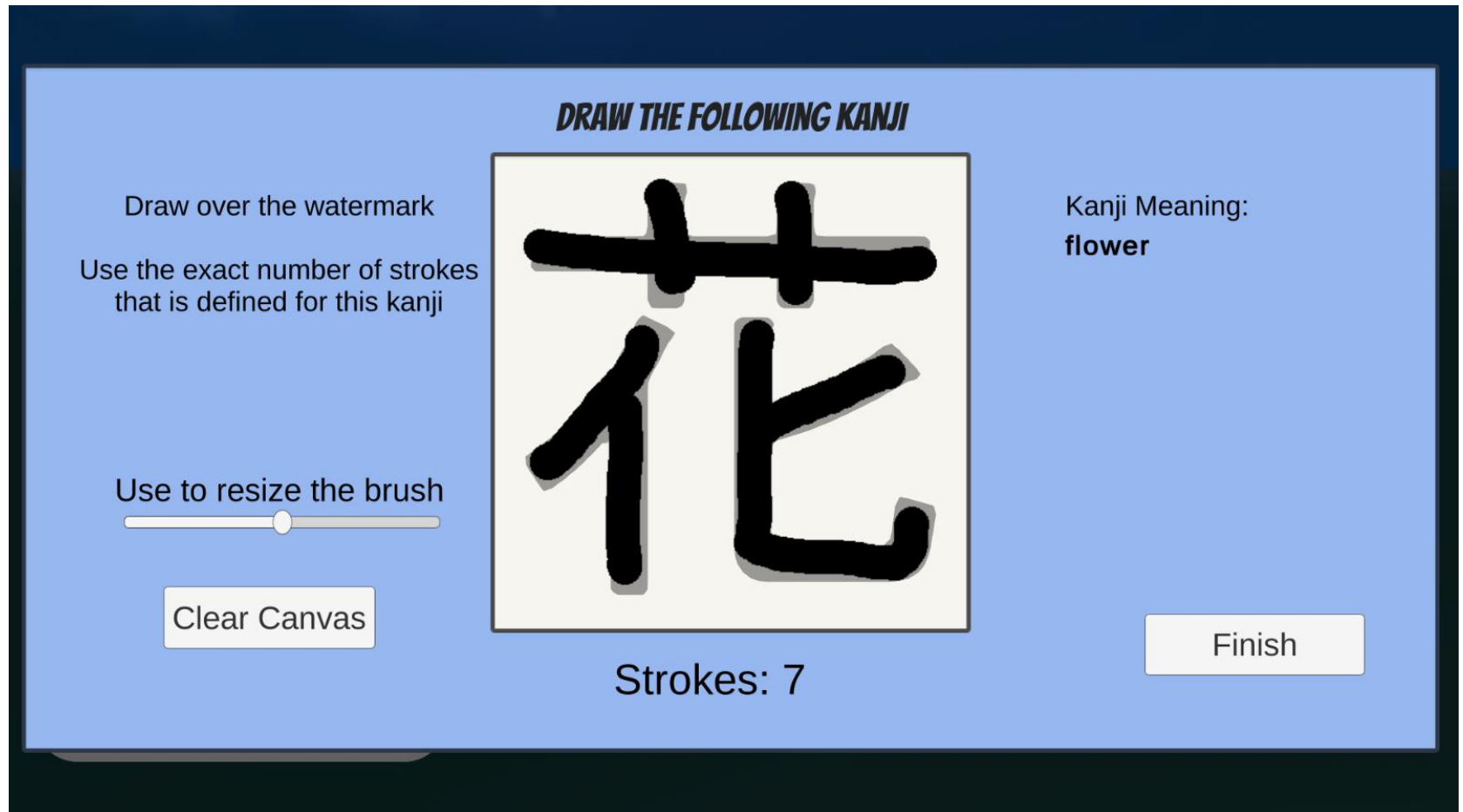


Implementation



The screenshot shows a drawing application interface with a light blue background. At the top center, the text **DRAW THE FOLLOWING KANJI** is displayed. In the center is a white square containing a large, light gray watermark of the kanji character for 'flower' (花). To the left of the square, the text 'Draw over the watermark' and 'Use the exact number of strokes that is defined for this kanji' is shown. Below this is a slider control labeled 'Use to resize the brush'. At the bottom left is a button labeled 'Clear Canvas'. At the bottom center, below the square, is the text 'Strokes: 0'. To the right of the square, the text 'Kanji Meaning: flower' is displayed. At the bottom right is a button labeled 'Finish'.

Implementation



DRAW THE FOLLOWING KANJI

Draw over the watermark
Use the exact number of strokes that is defined for this kanji

Use to resize the brush

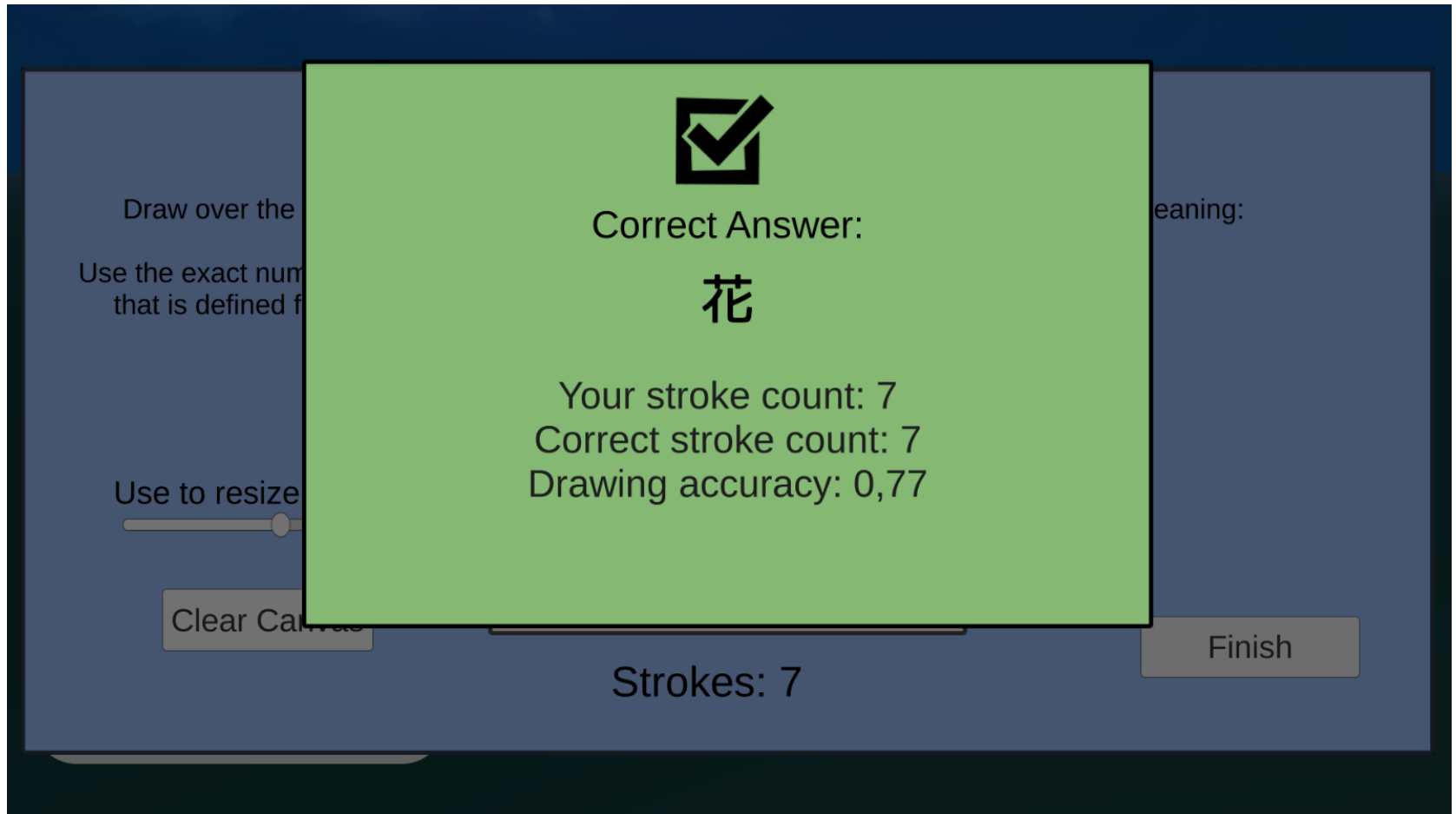
Clear Canvas

Strokes: 7

Kanji Meaning:
flower

Finish

Implementation



Implementation



Implementation



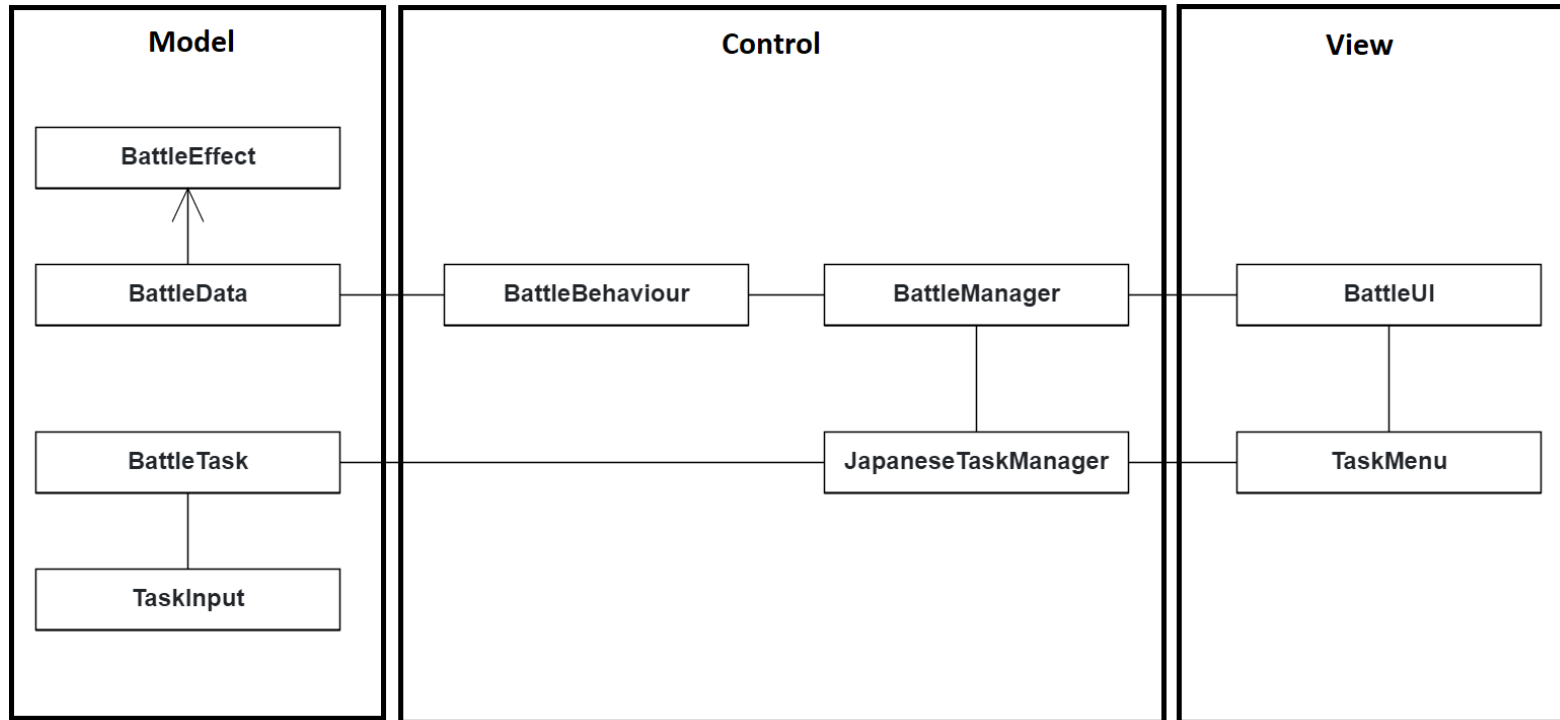
Implementation



Implementation



Implementation: MVC Pattern



Evaluation (User Studies, Test Runs)

- Conducted an informal user study with friends and family due to current circumstances
- Proposed the design of a formal user study in my thesis

Evaluation (User Studies, Test Runs)

Handout for each participant included:

- 1) Introduction
- 2) Infosheet
- 3) Walkthrough
- 4) Questionnaire
 - Personal Data
 - SUS questionnaire
 - General feedback and suggestions

Evaluation (User Studies, Test Runs)

- 8 participants (7 male and 1 female)
- Age ranging from 20 to 51 with an average of 31
- Most of the participants had experience with mobile applications
- But 50% of the participants had little to no experience with turn-based combat in video games
- Only 1 participant was experienced in Japanese, and the rest stated they have little to no knowledge

Evaluation (User Studies, Test Runs)

SUS

	item 1	item 2	item 3	item 4	item 5	item 6	item 7	item 8	item 9	item 10	SUS Score
P1	4	2	3	1	4	1	5	2	4	1	82,5
P2	3	1	4	1	4	1	4	2	4	2	80
P3	4	1	4	1	4	1	5	1	4	2	87,5
P4	4	1	5	1	4	2	5	1	4	1	90
P5	3	1	5	2	2	2	5	1	3	1	77,5
P6	4	2	5	1	5	2	5	1	4	1	90
P7	3	2	4	1	5	2	5	1	4	1	85
P8	4	1	5	1	4	1	5	1	5	1	95
SUS-Score Mittelwert											85,9375
SUS-Score Standardabw.											5,8152355

- “excellent” score, but might be influenced by the fact that all the participants were either family or friend

Evaluation (User Studies, Test Runs)

General feedback and suggestions

- (p) Intuitive and easy usage
- (n) Enemies too easy
- (n) Bigger punishment for failing a Japanese task
- (+) Including of sound effects + voicing Japanese words

Discussion / Suggested Future Work

Improvement of existing features

- Time limit for the Japanese tasks
- Descriptions for skills, items and buffs
- Audio feedback and/or haptic feedback

Possible additional features

- Include kana tasks
- Taking the player's level of Japanese into account
- Type system for skills, allies and enemies
- Including Japanese grammar
- Online-Multiplayer

Conclusion

- A suitable turn-based battle system was developed
- The informal user study shows that the battle system was well received
- A formal user study still needs to be conducted, and therefore a statement about the effectiveness of a turn-based battle system for learning Japanese could not be made

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1. Duolingo Inc. Duolingo website. url:
<https://www.duolingo.com> (visited on 09/29/2021)
2. W. Zhulong. Lingodeer website. url:
<https://www.lingodeer.com> (visited on 09/29/2021)
3. Babbel GmbH. Babbel website. url:
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4. D. Johnson. Slime Forest Adventure website. url:
<https://lrnj.com> (visited on 09/29/2021).

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5. Valve Corporation. Steam website - KOE. url: <https://store.steampowered.com/app/672430/Koe/> (visited on 09/29/2021)
6. Valve Corporation. Steam website - Learn Japanese To Survive! Kanji Combat. url: https://store.steampowered.com/app/759440/Learn_Japanese_To_Survive_Kanji_Combat/ (visited on 09/29/2021)