



Designing of Japanese Language Learning Media Using Virtual Reality Technology

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Abstract. Learning Research conducted at SMK Negeri 1 Cilacap focused on the importance of mastering various aspects of learning Japanese, with special emphasis on speaking skills. This research, based on observations and interviews with Japanese teachers and students, identifies the need for innovative and interactive learning tools to improve understanding of Japanese pronunciation. The proposed solution combines the latest technologies, including virtual reality, to create a more immersive learning experience. The development of this virtual reality application follows the Virtual Reality Development Life Cycle (VRDLC) as the chosen system development method. This app is designed for android devices with landscape screen orientation. This application displays 3D class objects containing material such as vocabulary, conversation simulations, and sentence patterns. Apart from that, to test students understanding, practice questions are available for each material.

Based on the results of the research stages that have been carried out, a Japanese language learning media application has been produced using Androidbased virtual reality technology that can run according to its function and in accordance with the aims and objectives of its design and creation. application. Based on the alpha test results, it shows that the virtual reality display can appear well according to the function created. This is proven by beta testing on users with the results of a questionnaire consisting of 2 teachers and 35 students with a

total of 37 respondents who said 28% agreed and 72% said they strongly agreed. With this it can be declared to be in the success category.

Keywords: Virtual Reality, Android, Learning Media, Japanese Language, Speaking Skills.

1 Introduction

The use of gadgets, especially in the field of Information and Communication Technology (ICT), is experiencing rapid growth in Indonesia. In the world of education, gadgets are felt to have a positive impact, namely the integration of new

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learning methods which make it easier for students and teachers in the learning process. A new learning method that is starting to develop is by combining gadgets and multimedia[1]. Multimedia has the function of clarifying the presentation of material, overcoming limitations of space, time and sensory power, and can overcome students passive attitudes[2]. The application of multimedia is increasingly developing, starting from twodimensional animation, three-dimensional animation, to Augmented Reality (AR) and Virtual Reality (VR)[3].

In education, the use of VR is considered a promising solution to overcoming the problem of loss of understanding in the learning process. In VR, users can enter a virtual world that is similar to the real world, so they can learn without having to leave home. Apart from that, VR also provides a fun alternative to providing new learning experiences for students. VR presents content in the form of interesting videos or images with an adjustable duration. There is a significant difference in students ability to differentiate, organize, and relate information when using VR. VR can be used effectively in practicums, allowing users to experience images, sounds, and sensations that are similar to the real environment. This VR technology can be applied in nursing practice, from first aid training to the process of caring for injured patients[4].

Several studies have been conducted, such as by Ahmad Wildan Syuja'ie to learn Japanese characters and their pronunciation[5]. Another study was also conducted by Tiwi Afriani Hasman to study Japanese characters. This application is equipped with features that explain Japanese language, hiragana characters, katakana characters, practice questions, and Japanese sentences[6]. Another study was also carried out by Joshua Allways Palutu Sianipar to introduce hiragana characters and vocabulary using audio and a question bank. This application was created using the Android Studio platform, which consists of hiragana, vocabulary, and practice question menu features with 2D animations[7].

Japanese Language is one of the foreign language subjects taught at SMKN 1 Cilacap. Japanese has differences compared to Indonesian, including the use of characters, grammar patterns, pronunciation systems, and more. The characters used in Japanese are Kanji, Hiragana, and Katakana, which are completely different from the latin alphabet used in Indonesian. Furthermore, Japanese grammar follows the Subject-Object-Verb (SOV) system, which difference from Indonesian's Subject-Verb-Object (SVO) pattern. Additionally, the pronunciation system in Japanese is also distinct from Indonesian. It cannot be denied that these differences often lead to difficulties for the majority of students in learning Japanese.

The obstacle that currently exists in practical Japanese learning is that teachers find it difficult to use conventional methods such as lectures, so teachers have to give pronunciation examples and repeat them because Japanese vocabulary has unique pronunciations. Viewed from the students perspective, the problem experienced is that in pronouncing Japanese vocabulary there are several vocabulary words that are similar in pronunciation, for example the word "*Kouchoushitsu*" which means principal's room, with the word "*Kyoushitsu*" which means classroom, the word "*Toshoshitsu*" which means room. library with the word "*Shokuinshitsu*" which means teacher's room. Second, most students often read words that should be read as long as short, for example the word "*Houki*" is read as "Hoki". On the other hand, students also read words that should be read short and read long. For example, the word "*Token*" is read as "Tookeii". Furthermore, there are several vocabulary words whose pronunciation is wrong, such

as the word "*Tsukue*" which is pronounced "Tusukee". Third, most students find it difficult to pause when pronouncing sentences in Japanese, because the students accent when speaking to become irregular.

Based on the problems, the author will develop a system different from previous research. The author will create an interactive Japanese language learning tool using Virtual Reality technology to enhance Japanese speaking skills, with a case study at SMK Negeri 1 Cilacap. The author will develop an Android-based application using the Unity 3D platform, incorporating both 2D and 3D animations.

2 Research Method

2.1 Multimedia

Multimedia is a combination of data, including images, sound, video, audio, animations, graphics, text, and other elements, which can be presented through a computer. In the field of education, multimedia serves as a highly effective and efficient tool for delivering learning materials to students. Its main advantage lies in interactivity, allowing interaction between users and media. In fact, multimedia conveys information quickly because it does not require detailed and careful reading[8]. The main characteristics of computer-based multimedia learning are: (1) utilizing computer facilities; (2) developed based on competencies; (3) the learning strategies employed include tutorials, practice and drills, problem-solving, games, or simulations; (4) tailored to the characteristics of students; (5) optimizing learning interactions; (6) flexibility in teaching and learning activities; (7) effective learning to sustain interest; (8) providing various feedback and can be done quickly; (9) suitable for various learning environments; and (10) assessing student competencies comprehensively and documenting grades effectively[9].

2.2 Virtual Reality

Virtual Reality (VR) is a technology capable of computers replicating real environments as well as imaginary and capable of stimulating the condition of physique users so that capable of interacting[10]. VR refers to the immersive, interactive, multi-sensory, computergenerated experience that produces a three-dimensional environment and the combination of technologies required to construct such an environment. VR has a system that is divided into four main components: input, application, rendering, and output. Input involves collecting data from the user, such as the position of the users eyes, hands, and button presses. Application encompasses the non-rendering aspects of the virtual world, including updating dynamic geometry, user interactions, and physics simulations. Rendering involves the transformation of computer-friendly formats into user-friendly formats that create the illusion of various forms of reality and includes visual and auditory rendering[11].

2.3 Learning Media

Learning media is an important element in the learning process that helps teachers enrich students insights. With the various types of learning media used by teachers, they can be a source of conveying knowledge to students[12]. Learning media functions

as a technique used to increase the effectiveness of interactions between teachers and students in the learning process. The benefits of learning media include providing guidance for teachers to achieve learning goals, increasing students' motivation and interest in learning, making students think critically and analyze the lesson material presented by the teacher effectively in a fun learning environment, and enabling students to understand material more easily[13].

2.4 Language Japan

Language serves as the most effective tool for conveying ideas and thoughts. Each language follows specific usage guidelines or rules, one of which is Japanese. Japanese adheres to an S-O-V (Subject-Object-Verb) structure. It boasts numerous unique aspects and isn't solely defined by its complex and extensive Kanji characters, but also by its sentence structure, particles, and vocabulary[14]. Moreover, Japanese also recognizes the categorization of words known as "Hinshi." In Japanese, these types of words are grouped into 10 categories: "meishi" (nouns), "i-keiyōshi" (i-adjectives), "na-keiyōshi" (naadjectives), "fukushi" (adverbs), "rentaishi" (pronouns), "setsuzokushi" (conjunctions), "kandōshi" (interjections), "dōshi" (verbs), "joshi" (particles), and "jodōshi" (auxiliary verbs / particles)[15].

2.5 Speaking Skill

Speaking skill is one of the language abilities that an individual needs to possess. This ability is not inherited like physical traits such as hair type or skin color. Many people are proficient at expressing their ideas in writing, but often they may not be as skilled at conveying their thoughts verbally[16]. Speaking skill is wrong one ability necessary language owned someone. Ability This is not an inherited ability in a way hereditary like form hair And color of skin. Many skilled people pour their ideas into form writing, however often they are not skilled enough skilled pour their ideas in form verbally[17]

2.6 Virtual Reality Development Life Cycle (VRDLC)

This study uses method Virtual Reality Development Life Cycle (VRDLC). Steps The VRDLC method is divided become seven stages that is concept, design, assets and materials, assembly, testing, distribution, and maintenance[18]. However, research this only until with stage distribution, because system This No There is maintenance in a way regular in the future by the writer.

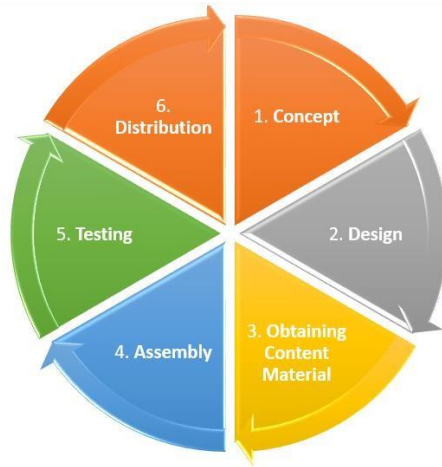


Fig 1. VRDLC Method.

1) Concept

Japanese language learning media using Android-based virtual reality has the concept of explaining vocabulary material for Japanese objects and rooms with the help of virtual reality technology. The name of the application that the author chose is "MOSHI-MOSHI" which is taken from Japanese which means "Hello". The working concept of this application is to provide material objects and rooms in a 3D classroom, presenting vocabulary, sentence patterns and conversation examples equipped with audio pronunciations.

2) Design

The design stage of the Japanese language learning media application is the stage that describes in detail the specifications for the application architecture, style, appearance, as well as the need for assets and materials in making the application. Specifications are made in detail at this stage so that at the next stage no new decisions are needed.

□ *HIPO*

HIPO (Hierarchy Input Process Output) is a method in system analysis and design that outlines the hierarchical structure of a system and illustrates the incoming input, processes performed, and resulting output. This method help in breaking down the system into smaller components for easier analysis and management, as well as comprehending the flow of information and data manipulation within the system. Predominantly used in information system development, HIPO enables developers and system analysts to grasp the system's functions prior to implementation.

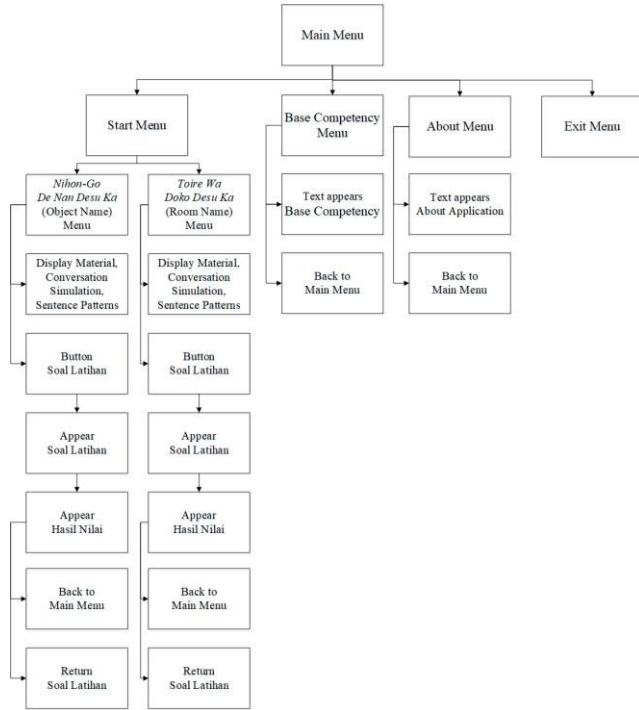
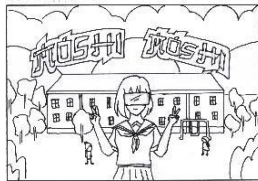


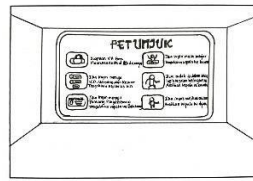
Fig 2. HIPO Structure.

□ *Storyboard*

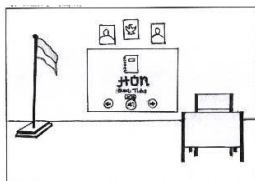
Storyboard is a sequential series of sketches or visual representations used to plan and organize the sequence of scenes or multimedia elements in a project.



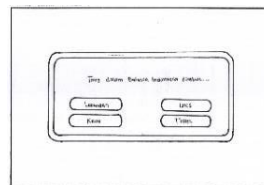
(a)



(b)



(c)



(d)

Fig 3. (a) Splashscreen (b) Main Menu
(c) Material (d) Quiz.

3) Obtaining Content Material

The assets and materials stage in the Japanese language learning media application is the stage that contains the collection of assets and materials needed to work on the application such as 2D objects, 3D objects, video and audio.

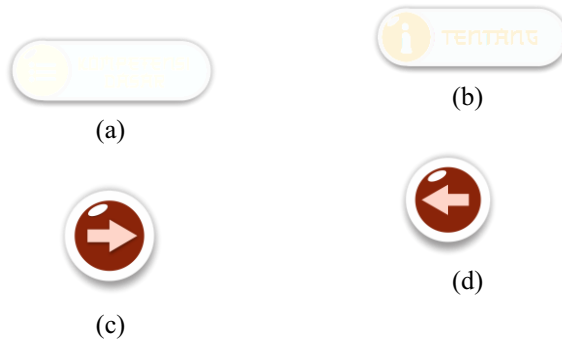


Fig 4. (a) Button Base Competency (b) Button About
(c) Button Next (d) Button Back.

4) Assembly

The assembly stage in Japanese language learning media is the process of combining materials that have been collected based on plans that have been prepared at the design stage, such as HIPO, flowcharts and storyboards. The assembly of this application includes assembling 3D objects for classrooms and school corridors using Blender 3.0.1 software and creating virtual reality applications using Unity 2019.4.12f1 software.



Fig 5. Assembling 3D Objects For Classrooms.



Fig 6. Creating Virtual Reality Applications.

5) Testing

The testing stage in the Japanese language learning media application is the process of testing the capabilities and performance of the application to see whether it is running properly. Testing the Japanese language learning media application uses the Alpha Testing stage which is the initial stage in testing. The testing process is carried out with the aim of showing the function of the application, whether its appearance matches the storyboard that has been created. Is the application created successful in accordance with the concept created by the author.

6) Distribution

The distribution stage is the final stage in the Japanese language learning media application development cycle. At this stage the application will be saved in a file with the extension (.apk) so that it can be installed on an Android device. Distribution can be done after the application is declared fit for use. At this stage, the application can be stored on a storage medium such as a CD, mobile device, or website. This stage can also be called the evaluation stage as material for developing the application to make it more perfect. The results of the evaluation can be used as input for further application development. Developed application already can walk in accordance with its function as well as in accordance with meaning and objective from planning and making an application.

3 Result And Analysis

3.1 Result

□ *Splashscreen Display*

The splashscreen display is the initial page that will appear when the application is first run. The splashscreen page displays a video containing the school background, characters, application title, and accompanied by sound.



Fig 7. Splashscreen Display

□ *Main Menu Display*

The Main Menu page contains 3 buttons, namely start, about, and exit, as well as explanations of application instructions and about the developer.

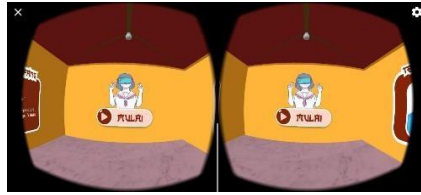


Fig 8. Main Menu Display

□ *Material Display*

The nihon-go nan desu ka (object names) material menu page contains vocabulary for object names along with pronunciation sounds in Japanese.

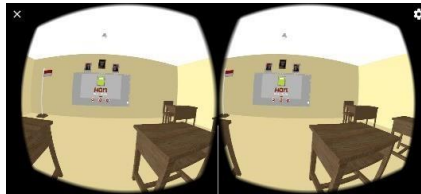


Fig 9. Material Display

□ *Quiz Display*

The nihon-go nan desu ka (name of object) practice question menu page contains 10 questions. If you complete them until the end, the score results will appear.

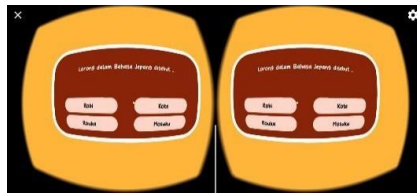


Fig 10. Quiz Display

3.2 Analysis

□ *Alpha Testing*

The testing phase in the Japanese language learning media application involves evaluating the capability and performance of the application to ensure it functions correctly. The testing of the Japanese language learning media application uses the Alpha Testing phase, which is the initial stage of testing. The testing process is carried out with the aim of demonstrating the application's functionalities and verifying if its interface aligns with the previously created storyboard. It also assesses whether the created application aligns with the concept envisioned by the author.

Table 1. Alpha Testing Splashscreen Display

Identification	
Process Name	Splashscreen Display
Purpose	Displays the splashscreen
Description	
Actor	Author
Skenario Utama	
Initial Conditions	Display : a. Application character b. Application title c. Application sound
Actor Action	Opening the Application
Application Reaction	The application displays a splashscreen page with a duration of 3 seconds
Final Condition	The application displays a splashscreen page with a duration of 3 seconds
Result	As expected

□ Beta Testing

Beta testing is a test conducted by application users. In this beta testing phase, users are asked to fill out a questionnaire regarding the Japanese language learning application to assess its suitability for use. The questionnaire-based testing consists of five questions distributed to 37 respondents, comprising 2 teachers and 35 students.

Final completion of percentage calculation for each response option:

$$\text{Percentage (\%)} = \frac{\text{Jumlah Responden Setiap Pilihan}}{\text{Jumlah Total Responden}} \times 100$$

(Number of Respondents for Each Option) / (Total Number of Respondents) x 100

Table 2. Questionnaire Calculation

Scale	Information	Amount Respondent	Percentage
1	Strongly Disagree	0	(0 / 185) x 100 = 0%
2	Disagree	0	(0 / 185) x 100 = 0%
3	Agree	52	(52 / 185) x 100 = 28%
4	Strongly Agree	133	(133 / 185) x 100 = 72%

The overall questionnaire results can be concluded from 37 respondents that 72% chose scale 4 with the statement strongly agree, 28% chose scale 3 with the statement agree. There were no respondents who chose scale 1 with the statement strongly disagree or scale 2 with the statement disagree. Based on the results of these calculations, the respondents strongly agreed.

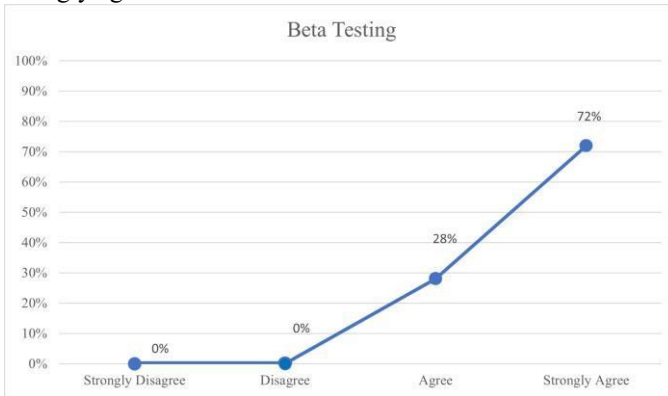


Fig 11. Questionnaire Result.

4 Conclusion

Based on the results analysis from the testing process on learning media applications Language Japan uses Android-based virtual reality technology can concluded as follows:

- Developed application already can walk in accordance with its function as well as in accordance with meaning and objective from planning and making an application.
- Based on the results alpha test testing shows that virtual reality display can come on stage with Good in accordance with the created function.
- That thing proven with beta testing against users with results questionnaire consisting of 2 teachers and 35 students with a total of 37 respondents who stated that 28% agreed, and 72% said Very Agreed. With That can enter in category It worked.

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