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Designing a Web Based Application to Memorize Korean Vocabulary Using Flashcards

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Abstract

Korean language learning in the digital age is increasingly important as the global community's interest in Korean culture increases. One of the main challenges in learning Korean is memorizing vocabulary that is very large and has varying levels of difficulty. Traditional methods that are often used, such as manual memorization, are often less effective and tedious, thus lowering learning motivation. The main problem in learning Korean vocabulary is the lack of tools that can support the memorization process effectively and interactively. Many of the traditional methods used, such as jotting down vocabulary in books or manually repeating words, have proven to be less effective because they tend to be monotonous and do not provide direct feedback to the user. Additionally, the method is often poorly structured, making it difficult for users to monitor their progress or identify the vocabulary that needs more attention. The lack of interactive tools also has an impact on learning motivation, where users can quickly get bored or frustrated with slow progress. Therefore, this study aims to develop a web-based application that uses the flashcard method. The development method used is the Waterfall method, which consists of five main stages: needs analysis, system design, implementation, testing, and maintenance. At the needs analysis stage, user needs are identified to ensure that the application can meet their expectations. System design involves creating an optimal interface design, process flow, and database structure. The result of this research is a web-based application that allows users to memorize Korean vocabulary more effectively using the flashcard method. This application is equipped with an evaluation feature that helps users monitor their learning progress. The use of web-based applications with the flashcard method has been scientifically proven to improve vocabulary retention, especially in the context of foreign language learning. The flashcard method works on the principle of spaced repetition, which psychologically strengthens long-term memory.

Keyword : Applications, Flashcard, Korean, Waterfall, Vocabulary Memorization

1. Introduction

Korean language learning has become increasingly popular in various parts of the world, including Indonesia, along with the increasing influence of Korean culture, known as the Korean Wave or Hallyu [1]. Interest in the Korean language comes not only from fans of K-Pop music and Korean dramas, but also from academics, professionals, and students who are interested in exploring Korean culture and literature. One of the most common challenges in learning Korean is the mastery of a very broad vocabulary that has different characteristics from other languages, both in terms of phonetics and morphological structure [2].

The problem that Korean language learners often face is the lack of interactive learning aids that are able to support the vocabulary memorization process effectively and systematically. Many learners still rely on conventional methods such as memorizing through textbooks or word lists, which tend to be monotonous and less interesting. In addition, the method does not always provide enough feedback, making it difficult for learners to know the extent to which they have mastered the vocabulary they are learning. In the context of modern learning that is increasingly technology-based, innovation in learning methods is needed to increase learning effectiveness and efficiency.

As a solution to this problem, this study proposes the development of a web-based application that uses the flashcard method to help students memorize Korean vocabulary. Flashcards have long been known as one of the effective learning techniques in improving memory through repetition and association. By utilizing web technology, the application is expected to provide a more interactive and flexible learning experience, as well as allow users to learn anytime and anywhere [3].

In several previous studies, the use of flashcards as a learning aid has been shown to be effective in a variety of contexts, including in learning other foreign languages. For example, research by [4] shows that the use of digital flashcard apps can improve English vocabulary retention in foreign learners. Another study by [5] also found that the use of digital flashcards helps increase motivation to learn Chinese among learners. However, these studies have not specifically examined the development of web-based applications for learning Korean vocabulary. In addition, the approach used in previous research has often been limited to mobile or offline applications, without considering the flexibility and ease of access offered by web-based applications [6].

To achieve the objectives of this study, the development method used is the Waterfall method, which consists of sequential stages ranging from needs analysis, system design, implementation, testing, to maintenance [7]. The Waterfall method was chosen because of its structured nature and allows each stage of development to be carried out in depth. In this study, the needs analysis stage will focus on identifying the features needed by users to support their learning process [8]. The system design phase will include interface design and process flows, while the implementation phase will involve the development of applications using the latest web technologies [9]. The testing phase will ensure that the app works according to the specifications that have been set, and the maintenance phase will focus on updates and feature improvements based on user feedback. With this web-based application, it is hoped that the Korean vocabulary memorization process can be carried out more effectively, efficiently, and interestingly, and be able to answer the needs of students in the digital era.

2. Method

The methods used in this study are as follows [10]:

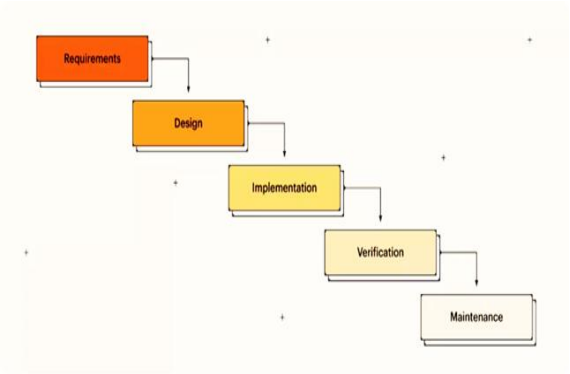
A. Data Collection Methods

Data collection methods are procedures used to collect information or data needed in a study. The following are the data collection methods used in this research:

1. Questionnaire: collecting data to the community in Pamulang South Tangerang by providing a series of questions related to the research theme. The survey questions were designed to measure the effectiveness of the application in improving vocabulary retention as well as the level of user satisfaction such as the Flashcard Application Usage Experience.
2. Literature Studies: collecting data to complete research through journals, books as a reference used in completing the research carried out.

B. System Development Methods

The development method in making this flashcard application uses the waterfall method. The



following are the stages of the waterfall method used in this research [11]:

Fig 1. Stages of the Waterfall Method

The following is an explanation of the stages of the waterfall method [12][13]:

1. Requirements

   At this stage, the development team interacts with stakeholders, including end users, to understand their expectations and needs for the system. This process involves gathering information through interviews, surveys, and group discussions, as well as the analysis of relevant documents. The result of this stage is a detailed requirements specification document, which serves as a reference for the entire subsequent development process. This document includes the desired functionality, system limitations, and success criteria, ensuring that all parties have a common understanding of what will be built.

2. Design

   At this stage, the development team designs the system architecture, including the software components, user interface, and interactions between modules. This design is usually divided into two parts: a high-level design that provides an overview of the structure of the system, and a low-level design that details the specific implementation of each component. The result of the design stage is a clear and detailed design document, which will guide the developer in the implementation stage, as well as ensure that all functional and non-functional needs have been properly considered and planned.

3. Implementation

   Implementation is a stage in the Waterfall method where developers start writing code for the system based on a pre-built design. At this

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stage, the development team translates the specifications and design of the system into working software. This process involves programming, unit testing, and component integration to ensure that each part of the system works well individually and in an overall context. In addition, the implementation also includes code documentation and the setting of the development environment. The result of this stage is that the software is ready for further testing, and is an important step before the software can be implemented in a production environment.

4. Verification
Testing is a crucial stage in the Waterfall method that is carried out after the implementation of the software. At this stage, the software that has been developed is thoroughly tested to ensure that it works according to the specifications that have been set. The testing process includes various types of testing, such as unit testing, integration testing, system testing, and acceptance testing. The purpose of testing is to identify and fix any bugs or errors that may exist, as well as to ensure that the software meets the needs of the user and operates properly under a variety of conditions. The result of this stage is a test report that includes findings, identified issues, and repair status, which forms the basis for a decision on whether the software is ready for deployment in a production environment.

5. Maintenance
Maintenance is the last stage in the Waterfall method that takes place after the software has been deployed and used by the end user. At this stage, the software requires continuous attention to ensure that it remains functional properly and meets the needs of the user over time. Maintenance includes a variety of activities, such as bug fixes found after deployment, updates to improve performance, and the addition of new features based on user feedback. In addition, maintenance also involves managing changes that may be necessary due to changes in the operating environment or business needs. This process is important to maintain the relevance and effectiveness of the software, as well as to ensure long-term user satisfaction. Maintenance can be an ongoing process and often requires additional resources to deal with issues that arise after the software is launched.

3. Result and Discussion

A. Database Design

Database design is a step to map a conceptual model to the database to be implemented (Lina and Sitio, 2024). The design of the database of Korean vocabulary memorization applications is as follows: Users interact with the flashcards in the app by looking at the Korean word on the front of the card, trying to remember its meaning, and then flipping the card to see the Indonesian definition. After that, users self-assess their understanding, which the system uses to measure the frequency of card occurrences based on mastery level. During testing, positive results noted included increased vocabulary retention, a more enjoyable learning experience, and short learning moments because the app can be accessed at any time. However, several challenges also emerged, such as the limited number of understandings and the lack of audio features to assist pronunciation, which became input for further development.

1. Entity Relationship Diagram (ERD)

The ERD diagram below illustrates the database structure for Korean vocabulary memorizing applications using website-based flashcards. Each flashcard has important attributes such as words in Korean.

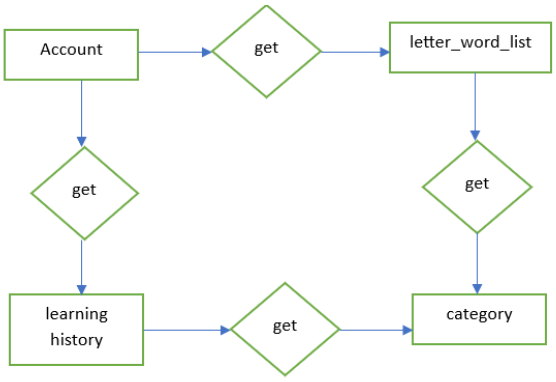

Fig 2. Entity Relationship Diagram

2. User backend Implementation

A user backend is a dedicated administrative interface designed specifically for admins to manage and oversee the content and functionality of the Korean vocabulary learning application. This page provides a secure environment where administrators can access exclusive menus and tools that are not available to regular users, ensuring that sensitive operations are conducted with appropriate permissions. Key features of the user backend include the ability to manage the Korean alphabet and vocabulary tables, allowing admins to add, edit, or delete entries as needed to keep the content up-to-date and relevant. Additionally, the backend facilitates the input of new Korean letters or vocabulary, enabling admins to expand the learning resources available to users. This functionality is crucial for maintaining the quality and accuracy of the educational material, as it allows for continuous improvement and adaptation to user needs. Furthermore, the user backend may

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include analytics tools that provide insights into user engagement and performance, helping admins make informed decisions about future updates and enhancements to the application. Overall, this administrative page plays a vital role in ensuring the smooth operation and ongoing development of the language learning platform.Here is a table of user backend implementations:

a. Menu Home

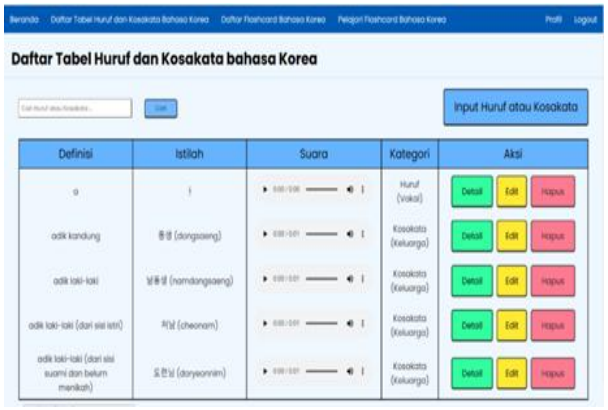
This page serves as the main interface for a web application designed specifically to aid users in memorizing Korean vocabulary effectively. The application features a user-friendly layout that allows learners to navigate seamlessly through various sections, including vocabulary lists, flashcards, and quizzes tailored to different proficiency levels. Users can easily access categorized vocabulary sets based on themes such as everyday conversation, travel, or academic terms, enhancing their learning experience. Additionally, the application incorporates interactive elements, such as audio pronunciations and spaced repetition algorithms, to reinforce memory retention and improve pronunciation skills. With progress tracking and personalized study plans, this platform aims to provide a comprehensive and engaging environment for users to enhance their Korean

language skills efficiently

Fig 3. Menu Home

b. Korean Vocabulary List Page

This page serves as a dedicated feature within the web application that offers users a comprehensive collection of Korean vocabulary, designed to facilitate effective language learning. Users can explore an extensive array of vocabulary categorized by themes such as daily activities, travel, food, and more, allowing for targeted learning based on their interests and needs. Each vocabulary entry includes not only the Korean word but also its pronunciation, meaning, and example sentences to provide context, enhancing comprehension and retention. The interface is intuitive, enabling users to easily search for specific words or browse through categories, making the learning process both engaging and efficient. Additionally, this feature may incorporate interactive elements such as quizzes and flashcards, allowing

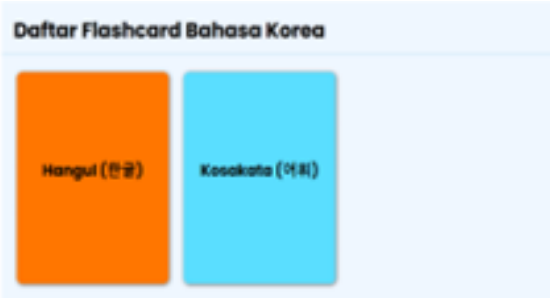


users to test their knowledge and reinforce their learning in a fun and dynamic way.

Fig 4. Korean Vocabulary List Page

c. Korean Flashcard Page

The digital card system is designed to enhance the learning experience by providing a visually engaging and dynamic way to study vocabulary. Each card typically displays a Korean word on one side, accompanied by its pronunciation, meaning, and example sentences on the reverse side. Users can flip the cards to test their memory and reinforce their understanding of the vocabulary. Additionally, the feature may include options for users to customize their study sessions, such as selecting specific categories or difficulty levels, and tracking their progress over time. This interactive approach not only makes learning more enjoyable but also leverages techniques like spaced repetition, which is proven to improve retention and recall. By incorporating gamification elements, such as points or rewards for completing sets of cards, this feature motivates users to engage consistently with their studies, ultimately



leading to a more effective and enjoyable language learning journey.

Fig 5. Korean FlashcardPage

d. Consonant Flashcard Page

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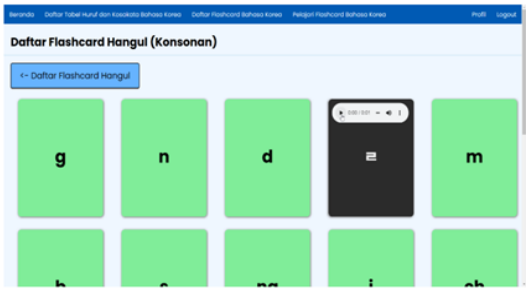
The menu of this page is a special section designed to help users learn and memorize consonants in Korean. This feature is designed to provide a structured and engaging approach to mastering the foundational elements of Korean phonetics. Users can explore each consonant through interactive lessons that include audio pronunciations, visual representations, and example words that illustrate their usage in context. The menu may also incorporate quizzes and flashcards to reinforce learning, allowing users to test their knowledge and track their progress as they become more familiar with the sounds and shapes of each consonant. By breaking down the learning process into manageable segments, this section aims to build users' confidence and competence in reading and pronouncing Korean words accurately. Additionally, the inclusion of mnemonic devices and practice exercises helps to enhance

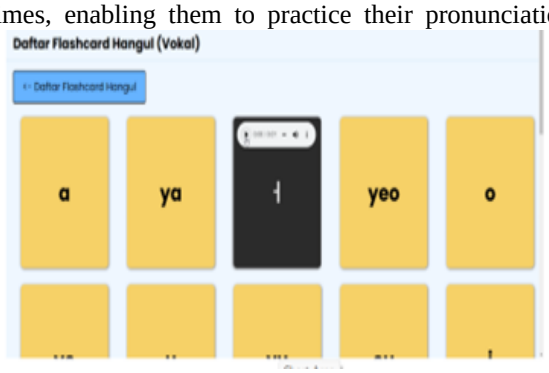


retention, making it easier for learners to recall the consonants when constructing words and sentences.

Fig 6. Consonant Flashcard Page

e. Vocal Flashcard Page

This page features an audio pronunciation tool that enhances the learning experience by allowing users to hear how each Korean vowel is pronounced. By integrating audio clips alongside the written representation of the vowels, users can develop a more accurate understanding of the sounds associated with each character. This auditory component is crucial for language acquisition, as it helps learners associate the visual form of the vowel with its correct pronunciation, thereby improving their speaking and listening skills. Users can play the audio multiple times, enabling them to practice their pronunciation



and refine their accent through repetition.

Fig 7. Vocal Flashcard Page

4. Conclusion

Based on the findings and analysis of the results of the research that has been carried out, this application has succeeded in providing effective and interactive learning tools to facilitate users in memorizing Korean vocabulary. By utilizing flashcard technology integrated with the web platform, the app offers a structured learning experience and allows users to access, iterate and test their ability to understand Korean vocabulary independently and flexibly. The application also shows that a web-based digital approach in learning to memorize Korean can provide a practical solution in accelerating to add and memorize foreign languages such as Korean. Further research could focus on testing the effectiveness of the app in real-world language learning scenarios, such as formal classes, online courses, or self-paced learning, involving larger samples and more in-depth statistical analysis to measure the impact on long-term retention and learning motivation.

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