

Development of E-Card Media for Learning Japanese Vocabulary for Grade XI Students

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ABSTRACT

Vocabulary mastery is one of the important aspects of learning Japanese because it is the basis for students to understand and use language in various communication contexts. However, based on the results of observations and interviews in class XI PH 6 SMKN 1 Tegallalang, vocabulary learning still faces obstacles in terms of understanding and remembering vocabulary as well as the limitations of the variety of learning media used. This study aims to develop E-Card media for learning Japanese vocabulary and describe the feasibility level of the developed media. This study uses the Research and Development (R&D) method with the ADDIE model which consists of five stages, namely analyze, design, development, implementation, and evaluation. Data was obtained through observation, interviews, validation of material experts, validation of media experts, and questionnaires of teacher and student responses. The product trial involved seven students in grade XI PH 6 SMKN 1 Tegallalang and one Japanese teacher. The data was analyzed descriptively by calculating the percentage of the eligibility score. The results showed that the media obtained a score of 96 from material experts, 88 from media experts, 96.92 from teacher responses, and 90.24 from student responses, all of which were in the very feasible category. Thus, the E-Card media developed was stated to be very feasible as an alternative media in learning Japanese vocabulary. This research produced digital paired card media that can be accessed through digital devices and equipped with exercises to support vocabulary learning.

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1. INTRODUCTION

Japanese language learning in Indonesia continues to grow, including at the Vocational High School (SMK) level, which prepares students to face the needs of the world of work. Based on the Survey Report on Japanese-Language Education Abroad published by The Japan Foundation (2024), the number of Japanese language learners in Indonesia reached 732,914 people and placed Indonesia as the country with the second highest number of Japanese language learners in the world. This

condition shows that the need for Japanese language learning that is in accordance with the characteristics of students and technological developments is increasingly important.

In learning Japanese, vocabulary mastery is one of the important foundations because it supports the understanding and use of language in language skills. However, based on the results of interviews with Japanese language teachers at SMKN 1 Tegallalang on April 10, 2025, vocabulary mastery of grade XI PH 6 students is still relatively low. Learning has utilized PowerPoint, textbooks, and YouTube videos, but its use still faces several obstacles, such as unclear display and audio, limited text sizes, too long video durations, and less varied media use. In addition, Japanese learning is only carried out once a week with an allocation of two hours of lessons. The results of the questionnaire also show that 56.7% of students still have difficulty mastering Japanese vocabulary and students need visual-based media that can be accessed through smartphones.

The development of digital technology provides opportunities to present more flexible and interactive learning media. Paired card media has also been used in several studies as an alternative to learning vocabulary and understanding meaning. Apriliana and Arini (2024), for example, developed paired card media to help students understand the meaning of expressions, while Arsini and Kristiantari (2022) developed word cards and picture cards for learning Indonesian vocabulary. Other studies also show the use of card media in learning Indonesian, Arabic, and IPAS. However, these studies generally still use conventional card media, focus on languages other than Japanese, or have not integrated paired cards with digital access according to the needs of students.

Based on these conditions, there is a gap between students' needs for flexible and technology-based visual learning media and the availability of Japanese vocabulary learning media used in class XI PH 6 SMKN 1 Tegallalang. Therefore, it is necessary to develop media that not only presents vocabulary and images, but also allows students to carry out interactive matching activities through digital devices.

This research aims to develop E-Card media as a learning medium for Japanese vocabulary for students in grade XI PH 6 SMKN 1 Tegallalang and describe the level of feasibility of the media developed based on the assessment of material experts, media experts, teachers, and students. The novelty of this research lies in the development of paired cards in digital form that combines vocabulary cards and picture cards, matching activities, and quizzes in one medium that can be accessed through digital devices. The media is developed based on the needs of students and includes six learning themes, namely *aisatsu*, *mochimono*, *kyoushitsu*, *kazoku*, *gakkou no seikatsu*, and *dekiru koto*.

2. METHODS

This research uses the Research and Development (R&D) method which aims to produce and test the feasibility of a learning product. The development model used is ADDIE which consists of five stages, namely analyze, design, development, implementation, and evaluation. The ADDIE model was chosen because it provides systematic development stages ranging from needs analysis to product evaluation.

Tahap Analyze

The analysis stage was carried out to identify the learning needs of Japanese vocabulary in grade XI PH 6 SMKN 1 Tegallalang. Information collection was carried out through semi-structured interviews with Japanese teachers on April 10, 2025 and learning observation on May 9, 2025. The results of the analysis showed that there were difficulties in students in remembering and understanding Japanese vocabulary as well as the limitations of the variety of learning media used. The media used previously was in the form of PowerPoint, textbooks, and YouTube.

Design Stage

The design stage is carried out by designing the structure and appearance of the E-Card media based on the results of needs analysis. The media is designed in the form of digital paired cards that connect Japanese vocabulary with appropriate images. The material is compiled based on the learning

used by students by referring to the book Nihongo Raku-Raku. The media includes six themes, namely *aisatsu*, *mochimono*, *kyoushitsu*, *kazoku*, *gakkou no seikatsu*, and *dekiru koto*. At this stage, visual displays, navigation, instructions for use, and exercises to recall vocabulary are also designed.

Tahap Development

The development stage is carried out by realizing the design into an E-Card product. The product is then validated by material experts and media experts. The validation of the material experts is carried out on April 22, 2026, while the validation of the media experts is carried out on April 28, 2026. The expert assessment includes material suitability, accuracy and clarity, visual appearance, media use, and media practicality. Input from the validator is used as a basis for product revisions.

Tahap Implementation

The implementation stage was carried out through product trials for Japanese teachers and students of grade XI PH 6 SMKN 1 Tegallalang. The trial involved seven students selected based on the teacher's recommendation by considering the variation in students' academic abilities. In addition, teachers responded to the developed media. The trial was conducted to obtain information regarding acceptance, ease of use, suitability of learning, and feasibility of media.

Tahap Evaluation

The evaluation stage was carried out by analyzing the results of validation of material experts, media experts, teacher responses, and student responses. The data obtained was analyzed descriptively using the percentage of scores. The results of the analysis were used to determine the level of feasibility of E-Card media based on the criteria that had been set.

The research data consisted of qualitative and quantitative data. The qualitative data was in the form of comments and suggestions from validators, teachers, and students, while the quantitative data was in the form of assessment scores on validation sheets and response questionnaires. Quantitative data analysis was carried out by calculating the percentage of scores obtained compared to the maximum score, then the results were categorized based on the feasibility criteria used in the study. This study focused on product development and feasibility. Therefore, the study was not designed to test the effectiveness of E-Cards in improving learning outcomes or compare learning outcomes between experimental and control groups.

3. FINDINGS AND DISCUSSION

3.1 Results

The development of E-Card media is carried out through five stages of ADDIE, namely analyze, design, development, implementation, and evaluation. In the analyze stage, it was found that students in grade XI PH 6 SMKN 1 Tegallalang had difficulties in remembering and understanding Japanese vocabulary. The media used in previous learning was in the form of PowerPoint, textbooks, and YouTube, so alternative media were needed that were more varied and could support vocabulary exercise.

In the design and development stage, the media is designed in the form of digital paired cards that connect Japanese vocabulary with images. The media contains six themes, namely *aisatsu*, *mochimono*, *kyoushitsu*, *kazoku*, *gakkou no seikatsu*, and *dekiru koto*. The product is then validated by material experts and media experts and revised based on validator input. Some of the revisions are related to the suitability of the images with vocabulary, clarity of instructions for use, and time allocation adjustments for each theme.

Table 1. Overall Assessment Results

Assessment Type	Score	Criteria
Material Expert Test	96	Highly Worth It
Test Media Experts	88	Highly Worth It
Teacher's Response	96,92	Highly Worth It
Student Response	90,24	Highly Worth It

The results of the assessment showed that the media obtained a score of 96 from the material expert and 88 from the media expert. After the product was used in the trial, the teacher's response obtained a score of 96.92 and the student's response obtained a score of 90.24. The four results were in the very feasible category based on the assessment criteria used. Thus, the results of expert validation and user responses showed that the E-Card had met the aspects of material feasibility, display, use, practicality, learning suitability, and user acceptance. The product can then be used as one of the media alternatives in learning Japanese vocabulary in the appropriate context.

3.2 Discussion of Research Results

Based on the results of interviews with Japanese language teachers at SMKN 1 Tegallalang, it is known that the learning media used is still limited to PowerPoint, textbooks, and videos from YouTube. This condition shows the need for a variety of learning media that can support learning Japanese vocabulary more interestingly. The results of the questionnaire for grade XI PH 6 students also showed that students prefer visual-based media, such as picture cards or paired cards, and need learning media that can be accessed via smartphones. Based on these needs, E-Card media was developed as a digital-based Japanese vocabulary learning medium that allows students to match vocabulary cards with picture cards.

The E-Card media developed consists of six themes, namely *aisatsu*, *mochimono*, *kyoushitsu*, *kazoku*, *gakkou no seikatsu*, and *dekiru koto*. The six themes are representations of the nine themes contained in the *Nihongo Raku-Raku* book. The selection of themes is adjusted to relevant materials to support students' vocabulary learning. This media is equipped with images that are tailored to the vocabulary presented so that students can connect vocabulary with objects visually. The images used come from the results of Artificial Intelligence (AI) generation, photos used in media development, as well as several images from the internet that are relevant to the material.

The feasibility of the E-Card media is known through the assessment of material experts, media experts, teachers, and students. The results of the validation of the material experts obtained a score of 96, while the validation of the media experts obtained a score of 88. Both results are included in the very feasible category. Based on the input from experts, several improvements were made to the media, including improving images that have the potential to cause misunderstandings in meaning, adjusting the division of sections on each theme, and improving the assessment system in the media.

Furthermore, a limited trial was conducted on Japanese language teachers and seven students of grade XI PH 6. The results of the teacher's response obtained a score of 96.92, while the student's response obtained a score of 90.24. Both results are included in the very feasible category. The results show that E-Card media can be accepted by teachers and students and can be used as an alternative media in learning Japanese vocabulary. Overall, the E-Card media obtained assessment results that were in the very feasible category from all assessors. Thus, the E-Card media developed is suitable for use as an alternative learning media to support Japanese vocabulary learning for students in grade XI PH 6 SMKN 1 Tegallalang.

The development of E-Card media in this study demonstrates that the high feasibility scores obtained from material experts (96), media experts (88), teachers (96.92), and students (90.24) are not merely the consequence of attractive digital presentation, but reflect the compatibility between the characteristics of the learning problem and the instructional affordances embedded in the product. The initial analysis identified that students experienced difficulty remembering and understanding Japanese vocabulary, while existing media were dominated by PowerPoint, textbooks, and YouTube videos. E-Card responds to this condition by transforming vocabulary learning from predominantly receptive exposure into an activity involving visual recognition, matching, and recall. This is theoretically consistent with the principle of multimedia learning, in which verbal information can be strengthened when it is meaningfully integrated with corresponding visual representations. The result is also consistent with recent research showing that digital flashcards can facilitate vocabulary acquisition because learners repeatedly encounter lexical forms and their meanings through a compact and accessible digital format (Odo, 2024). A meta-analysis of 47 studies involving 3,869 participants found an overall significant influence of digital flashcards on L2 vocabulary learning, although the magnitude of effects varied according to contextual and methodological factors. Thus, the 96% material-feasibility score in the present study can be interpreted as evidence that the content-selection and vocabulary-image relationship were considered appropriate, rather than simply indicating that the media looked attractive.

The particularly high teacher response of 96.92% can be understood from the functional alignment between E-Card and teachers' practical instructional needs. Teachers require learning media that are not only pedagogically appropriate but also relatively simple to operate, clearly structured, and adaptable to limited classroom time. In this study, Japanese instruction was conducted only once a week with a two-hour lesson allocation, making a compact medium that combines presentation, practice, and assessment particularly relevant. E-Card integrates vocabulary cards, picture cards, matching activities, and quizzes within one digital environment, reducing the need for teachers to move between several media. This finding is consistent with research demonstrating that mobile-assisted digital flashcards can support vocabulary learning more effectively than conventional learning materials, particularly when learners can access the material through smartphones (Zarrati et al., 2024). Their experimental study involving 112 university students found that the smartphone digital-flashcard group demonstrated the strongest vocabulary gains compared with laptop and paper-flashcard groups. The similarity lies in the accessibility and portability of digital vocabulary learning, while the difference is important: the present study does not claim superior learning effectiveness because it was designed as development and feasibility research. Scientifically, therefore, the finding extends previous research by showing that the value of digital flashcards is not restricted to measurable vocabulary gains; their instructional feasibility can also be established through systematic expert and user validation before effectiveness is tested.

The student response score of 90.24% further indicates that E-Card addresses an important affective and behavioral dimension of vocabulary learning: students' willingness to engage with the learning activity. Vocabulary memorization can become repetitive when learners are required to repeatedly associate unfamiliar lexical forms with meanings without meaningful visual or interactive support. The paired-card mechanism changes this experience by requiring students to actively identify relationships between Japanese words and visual representations. This explains why students may perceive the medium as more interesting and easier to use than conventional text-based materials. Similar findings have been reported in recent research on digital flashcards, where technology-supported vocabulary activities have been associated with increased learner attention, enthusiasm, and vocabulary engagement (Parahiba & Nurkhamidah, 2024). Likewise, research on digital game-based vocabulary learning indicates that learner engagement is positively associated with vocabulary development and involves behavioral, cognitive, and emotional dimensions rather than merely exposure to digital content (2023). The present finding therefore supports the argument that the pedagogical value of E-Card is partly generated by its interactional structure: students do not merely

see vocabulary, but must process, compare, and retrieve it. Nevertheless, because the present study measured responses rather than longitudinal engagement or learning gains, the high student score should be interpreted as evidence of acceptance and perceived usefulness, not definitive evidence of improved vocabulary mastery.

Another important finding concerns the integration of visual representations with Japanese vocabulary. The E-Card was developed around six themes—*aisatsu*, *mochimono*, *kyoushitsu*, *kazoku*, *gakkou no seikatsu*, and *dekiru koto*—and each vocabulary item is connected with a relevant image. This design is particularly significant in Japanese learning because beginning and intermediate learners frequently encounter lexical items whose meaning cannot always be inferred directly from linguistic form. Visual association can consequently reduce the cognitive distance between an unfamiliar Japanese expression and its referent. The finding corresponds with research on digital flashcards demonstrating that combining lexical information with multimedia representations can support vocabulary learning through repeated retrieval and meaningful association. Zarrati et al. (2024), for example, found particularly strong outcomes when digital flashcards were accessed through smartphones, while a 2024 study of mobile-assisted digital flashcards reported improvements in both receptive and productive vocabulary knowledge, although receptive gains were stronger than productive gains. This distinction provides an important theoretical qualification for the present research. E-Card is likely particularly suitable for recognition and meaning association, but productive vocabulary competence requires additional activities involving sentence construction, oral production, contextual usage, and communicative interaction. Consequently, the 96% material-expert score should not be interpreted as evidence that E-Card alone can develop all dimensions of Japanese vocabulary competence.

The 88% media-expert score, although the lowest among the four assessment results, remains within the very-feasible category and is theoretically meaningful because it indicates that digital instructional quality depends on more than content accuracy. The revisions concerning image suitability, instructions, division of thematic sections, and assessment mechanisms demonstrate that a learning medium can possess academically appropriate content while still requiring refinement in its interface and instructional design. This finding supports the ADDIE framework because the development process does not treat the first version of a product as final; instead, expert feedback becomes a mechanism for identifying discrepancies between the intended instructional function and actual media design. Recent digital learning research similarly emphasizes that effective technology-enhanced language learning requires attention to visual design, learner agency, usability, and the relationship between technological features and pedagogical objectives rather than simply adding technology to existing instruction. Research on digital game-based language learning, for instance, stresses that visual design and learner agency must be deliberately optimized to produce meaningful language-learning experiences (2024). Therefore, the difference between the media-expert score (88) and the material-expert score (96) can be interpreted as an indication that the pedagogical content was already highly aligned with learning objectives, whereas the technological and visual dimensions required greater refinement. This provides an important implication for R&D studies: validation should evaluate instructional functionality, not merely aesthetic attractiveness.

The findings also show an important continuity with earlier studies on card-based vocabulary media while simultaneously demonstrating a technological shift. Previous research cited in this study, including work on paired cards, word cards, and picture cards, established that card-based media can facilitate vocabulary or meaning recognition by providing concrete associations between words and representations. The present E-Card extends this principle into a digital environment by combining paired cards with interactive matching and quizzes. Recent empirical evidence strengthens this interpretation. Studies involving Indonesian learners have found that digital flashcards can produce better vocabulary outcomes than conventional instruction, including research with seventh-grade students in Mataram in which the digital-flashcard group achieved substantially higher post-test performance than the comparison group (Munigarim et al., 2024). Similarly, HTML-based digital

flashcards developed through the ADDIE model have been reported as feasible and effective for vocabulary learning (Rahma & Widagdo, 2024). The similarity lies in the transformation of conventional flashcard principles into digital learning resources; however, the present study contributes a more specific application to Japanese vocabulary at the vocational high-school level, whereas many recent studies focus on English vocabulary and university or elementary learners. This contextual specificity is scientifically important because vocabulary-media effectiveness cannot automatically be transferred across languages, age groups, and learning environments. E-Card therefore represents contextual adaptation rather than simply another digital-flashcard product.

Finally, the overall pattern of results—very high feasibility across all assessors—supports the conclusion that E-Card is a promising alternative medium, but it simultaneously establishes a boundary that should be recognized in interpreting the contribution of the research. The study demonstrates that a systematically developed digital paired-card medium can achieve strong expert validation and positive user acceptance, yet it does not establish causal evidence that E-Card improves Japanese vocabulary mastery. This distinction is particularly important because previous experimental studies have reported significant vocabulary gains from digital flashcards, including improvements in receptive and productive knowledge and, in some cases, delayed retention (Zarrati et al., 2024; 2024). The present study consequently occupies a different position in the research landscape: its primary contribution is developmental and design-oriented, establishing a validated instructional product that is ready for subsequent effectiveness testing. The scientific implication is that future studies should move beyond feasibility by employing pre-test/post-test or quasi-experimental designs, larger samples, delayed vocabulary tests, and measures of both receptive and productive Japanese vocabulary. Such research could determine whether the high usability and acceptance demonstrated here translate into durable vocabulary retention and actual communicative competence. In this sense, the present findings should not be understood as the endpoint of E-Card research, but as empirical groundwork demonstrating that the medium is sufficiently valid, usable, and contextually appropriate to justify more rigorous effectiveness investigations.

4. CONCLUSION

This research produced E-Card media for learning Japanese vocabulary for students in grade XI PH 6 SMKN 1 Tegallalang. The media was developed using the ADDIE model and in the form of digital paired cards that combine picture cards and vocabulary cards, matching activities, and quizzes in six learning themes, namely *aisatsu*, *mochimono*, *kyoushitsu*, *kazoku*, *gakkou no seikatsu*, and *dekiru koto*.

The validation results showed that the media obtained a score of 96 from material experts and 88 from media experts, while the trial obtained a score of 96.92 from teachers and 90.24 from students. All of these results are in the very feasible category. Thus, the developed E-Card media is suitable to be used as an alternative Japanese vocabulary learning media for students in grade XI PH 6 SMKN 1 Tegallalang.

This research is limited to product development and feasibility assessment and limited trials, so the results of the research cannot be used to conclude the effectiveness of the media on improving learning outcomes. Further research can test the effectiveness of E-Cards through a wider range of subjects and experimental designs as well as develop additional features such as audio, feedback, and scoring systems.

REFERENCES

- Adnyani, K. E. K. (2021). Development of Animated Video-Based Learning Media to Improve Japanese Language Competence. *Journal of Japanese Language Education Undiksha*, 9(1), 12–22. <https://ejournal.undiksha.ac.id/index.php/JJPBJ/article/view/33199>
- Apriliana, N, Arini, W. N. (2024). *Development of Paired Card Media to Introduce the Meaning of Expressions in Shiva Grade II Elementary School*. 14, 1–8.

- Arsini, R. Kristiantari, R. M. G. (2022). *Word Card and Picture Card Media in Indonesian Vocabulary Materials*. 5, 1–12.
- Arsyad, A. (2019). *Learning media*. Jakarta: Rajawali Press.
- Benlaghrissi, H., & Ouahidi, L. M. (2023). The impact of mobile-assisted language learning on developing EFL learners' vocabulary knowledge. *International Journal of Interactive Mobile Technologies*, 17(22), 38–51. <https://doi.org/10.3991/ijim.v17i22.41665>
- Boroughani, T., Behshad, N., & Xodabande, I. (2023). Mobile-assisted academic vocabulary learning with digital flashcards: Exploring the impacts on university students' self-regulatory capacity. *Frontiers in Psychology*, 14, 1112429. <https://doi.org/10.3389/fpsyg.2023.1112429>
- Branch, R. M. (2009). *Instructional design: The ADDIE approach*. New York, NY: Springer.
- Huang, S., Cao, H.-W., Wang, J., & Liu, S. (2025). The moderating role of learning rounds: Effects on retrieval practice and context dependence in digital flashcard foreign language vocabulary learning. *Behavioral Sciences*, 15(11), 1540. <https://doi.org/10.3390/bs15111540>
- Karimi, S. N., & Kheradmandi Amiri, R. (2025). The effects of using digital flashcards versus paper flashcards on vocabulary learning and retention of Iranian intermediate EFL learners. *Cogent Education*, 12(1), 2548353. <https://doi.org/10.1080/2331186X.2025.2548353>
- Mahdi, H. S., Mohsen, M. A., & Almanea, M. (2024). Multimedia glosses and second language vocabulary learning: A second-round meta-analysis. *Acta Psychologica*, 248, 104341. <https://doi.org/10.1016/j.actpsy.2024.104341>
- Munigarim, M., Melani, B. Z., Putera, L. J., & Arifuddin, A. (2024). The effect of using digital flashcards on English vocabulary mastery at seventh grade students of SMPN 17 Mataram. *Jurnal Ilmiah Profesi Pendidikan*, 9(4), 2982–2990. <https://doi.org/10.29303/jipp.v9i4.2915>
- Nawaz, M., Ganapathy, M., Manzoor, S., Ezzy, T., & Farooqi, S. U. H. (2025). A systematic review of mobile-assisted vocabulary learning and teaching in ESL/EFL context. *Malaysian Journal of Learning and Instruction*, 22(1), 40–58. <https://doi.org/10.32890/mjli2025.22.1.3>
- Odo, D. M. (2024). The effect of digital flashcard applications on L2 vocabulary learning: A quantitative meta-analysis. *Teacher Education Research*, 63(3), 317–339. <https://doi.org/10.15812/ter.63.3.202409.317>
- Okumuş Dağdeler, K. (2023). A systematic review of mobile-assisted vocabulary learning research. *Smart Learning Environments*, 10, 19. <https://doi.org/10.1186/s40561-023-00235-z>
- Rahma, N. K., & Widagdo, A. (2024). HTML-based digital flashcard media to improve the mastery of English vocabulary of 1st grade. *Jurnal Pendidikan Indonesia*, 13(3). <https://doi.org/10.23887/jpiundiksha.v13i3.78878>
- Teymouri, R. (2024). Recent developments in mobile-assisted vocabulary learning: A mini review of published studies focusing on digital flashcards. *Frontiers in Education*, 9, 1496578. <https://doi.org/10.3389/feduc.2024.1496578>
- The Japan Foundation. (2021). *Survey Report on Japanese-Language Education Abroad 2021*. Tokyo: The Japan Foundation.
- University students' academic vocabulary development through mobile-assisted learning: Exploring the impacts on receptive and productive knowledge. (2024). *Heliyon*, 10(7), e28103. <https://doi.org/10.1016/j.heliyon.2024.e28103>
- Yasar, S., & Kocoglu, Z. (2025). Enhancing vocabulary mastery: The impact of learner-created digital flashcards on L2 vocabulary learning and self-regulation. *Australasian Journal of Educational Technology*, 41(4), 17–31. <https://doi.org/10.14742/ajet.10402>
- Ye, J., Zhang, P., Kasproicz, R., & Tissot, C. (2025). Technology-enhanced vocabulary learning: The role of self-regulation and prior knowledge. *Language Learning & Technology*, 29(1), 1–31. <https://doi.org/10.64152/10125/73640>
- Zarrati, Z., Zohrabi, M., Abedini, H., & Xodabande, I. (2024). Learning academic vocabulary with digital flashcards: Comparing the outcomes from computers and smartphones. *Social Sciences & Humanities Open*, 9, 100900. <https://doi.org/10.1016/j.ssaho.2024.100900>