
Interactive Audio-Visual E-Flashcards to Improve Vocabulary Mastery in English Listening Skills

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Abstract

English vocabulary mastery in elementary school students listening skills remains relatively low, primarily due to the limited utilization of interactive audio-visual learning media. This study aimed to develop, validate, examine the practicality of, and evaluate the effectiveness of interactive audio-visual e-flashcard media in enhancing students' English vocabulary mastery within listening skills. The study employed a research and development approach using the ADDIE model, encompassing the stages of analysis, design, development, implementation, and evaluation. The research subject was the interactive audio-visual e-flashcard media, while the trial involved 22 fourth-grade elementary school students. Data were collected through interviews, observations, and questionnaires, with research instruments consisting of observation guidelines, rating scale sheets, and questionnaires. Data analysis included validity testing, descriptive analysis, and correlated t-tests. The findings indicated that the developed media achieved a high validity score of 3.71, while the material validity score was 3.29, both categorized as highly valid. Furthermore, the practicality results demonstrated very high qualifications, with teacher responses reaching 94%, individual student trials at 90%, and small group trials at 94%. Importantly, the effectiveness analysis revealed that the interactive audio-visual e-flashcard media was effective in improving students' English vocabulary mastery in listening skills.

Keywords: Interactive E-flashcard, Vocabulary Mastery, Listening Skills

INTRODUCTION

English is an important component of educational adaptation to globalization, which requires young generations to possess international communication skills (Prayogo, 2022). In response to this demand, the Indonesian government has provided opportunities for English learning at the elementary school level through local content policies, as stated in the Decree of the Ministry of Education and Culture of the Republic of Indonesia No. 0487/1992 and further reinforced in the Merdeka Curriculum (Melani et al., 2025). This policy underlies the inclusion of English as part of the local content curriculum in elementary school (Jayanti et al., 2024). English learning in elementary schools is expected to introduce basic language skills at an early age as a foundation for students to face global challenges.

In English language learning, listening skills are one of the fundamental language skills that must be mastered by students. Listening skills play an important role because they support the development of other language skills, such as speaking, reading, and writing (Zabrina et al., 2023). Listening activities require students to understand spoken language, which is highly influenced by vocabulary mastery. Without sufficient vocabulary knowledge, students will experience difficulties in understanding spoken messages (Hanafiah et al., 2022; Gilakjani & Sabouri, 2016). Therefore, vocabulary mastery is an essential component in developing students' listening skills.

Several studies have shown that vocabulary mastery has a significant relationship with students' listening skills. Students with higher vocabulary mastery demonstrated better comprehension during listening activities (Asrida et al., 2024; Sari et al., 2026). Also Vocabulary mastery positively and significantly affects students listening ability (Farvardin & Valipouri,

2017). These findings indicate that vocabulary mastery and listening skills are closely related and cannot be separated in English language learning.

However, in reality, elementary school students' English vocabulary mastery remains relatively low, which becomes a major obstacle in the process of English language learning. This limited vocabulary knowledge directly affects students' listening skills, as they struggle to recognize, interpret, and comprehend spoken English accurately. Empirical evidence supports this condition. A study on bilingual students in grades III–IV in Yogyakarta revealed that students experienced significant difficulties in understanding basic English vocabulary during listening activities, which led to passive classroom behavior and limited oral participation (Azizah, 2022). Similarly, another study reported that 66.67% of fourth-grade students at SD Plus Lantansa, Demak Regency, faced difficulties in understanding basic English vocabulary, particularly related to food and beverage themes, indicating that insufficient vocabulary mastery hindered students' listening comprehension (Sucandra et al., 2022).

Similar problems were also identified among fourth-grade students at SD Negeri 1 Gumbrih. Based on the results of interviews and classroom observations, approximately 78% of students were unable to accurately understand the meaning of English vocabulary when listening to oral explanations or instructions, which caused students to be passive and slow in responding. This condition occurred despite the school having adequate digital facilities and basic technological competence among teachers and students. However, the utilization of these facilities in English learning remains limited due to the absence of digital learning media specifically designed to support vocabulary mastery through listening skills. The continued use of conventional learning media with minimal interactive audio-visual elements has resulted in students' listening skills not developing optimally. Therefore, the development of interactive audio-visual learning media is needed to help students understand, retain, and use English vocabulary in a more meaningful way.

Learning media play an important role in supporting vocabulary mastery. Flashcard media combined with visual and audio elements have been proven effective in improving elementary school students' vocabulary learning (Nasution & Rahim, 2022; (Maya et al., 2024). Audio-visual learning media can increase student engagement and help students understand word meanings more contextually (Paldy et al., 2025). However, most existing studies still focus on conventional or simple digital flashcards without incorporating interactive features and listening exercises that provide immediate feedback.

The novelty of this research lies in the development of interactive audio-visual e-flashcard learning media designed to enhance elementary school students' English vocabulary mastery in listening skills. Multisensory stimulation through audio, video, and visual elements has been proven to create a dynamic and engaging learning environment and to help students associate words with sounds and visual representations within a communicative context (Syahid et al., 2024). The developed media integrate images, text, pronunciation audio, contextual videos, and interactive quizzes that provide immediate feedback to students. This integration is expected to create a more engaging and meaningful learning experience that aligns with the visual and auditory characteristics of elementary school students (Asikin, 2025). The interactivity of the media is reflected in features designed to promote students' active engagement in the learning process. Key features include audio buttons that allow students to independently listen to word and sentence pronunciation as needed, enabling repeated practice without reliance on the teacher. In addition, students can explore the e-flashcards through integrated contextual videos, and complete interactive exercises that provide immediate automated feedback.

Based on the explanation above, this study aims to develop interactive audio-visual e-flashcard learning media to enhance English vocabulary mastery in the listening skills of fourth-grade elementary school students. This research is expected to contribute to the development of

more engaging and effective learning methods for improving students' English vocabulary mastery in listening skills.

RESEARCH METHODS

This study employed the ADDIE development model. The ADDIE model was selected because it provides a systematic research mechanism that supports researchers in developing interactive audio-visual e-flashcard products that are feasible and effective for use in elementary school learning. This model facilitates the production of high-quality and effective learning media by allowing continuous evaluation and revision throughout the development process (Bramantio et al., 2024; Adeoye et al., 2024; Setiawan et al., 2021). The ADDIE model consists of five stages: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation (Junia & Sujana, 2023). In addition, the ADDIE model serves as a guideline for designing effective and dynamic instructional programs or learning infrastructures that optimally support instructional performance.

This development research employed a one-group pre-test–post-test design, which involves a single group of participants receiving treatment. The dependent variable was measured before the treatment (pre-test) and after the treatment (post-test) (Oh & Kim, 2023; Zakiah & Sulastri, 2024). The study was conducted at an elementary school located in Pekutatan District, Jembrana Regency, specifically at SD Negeri 1 Gumbrih. The research site was selected based on preliminary findings indicating that most students experienced difficulties in English vocabulary mastery within listening skills. In addition, students at the school demonstrated limited understanding of effective vocabulary mastery in listening skills, particularly among fourth-grade elementary school students.

The research procedure followed the five stages of the ADDIE model, namely analysis, design, development, implementation, and evaluation. The analysis stage involved an analysis of student characteristics, media analysis, and an analysis of learning needs through classroom observations and teacher interviews, and an analysis of instructional media based on quality learning media criteria. The design stage included material preparation and instructional media design using the Canva application, as well as consultations with the supervising lecturer. During the development stage, the designed media were validated by subject matter experts, media experts, and practitioners, followed by revisions and limited trials.

The implementation stage was carried out through field testing with fourth-grade students at SD Negeri 1 Gumbrih using a pre-experimental one-group pre-test–post-test design to determine the effectiveness of the developed learning media. Subsequently, the evaluation stage was conducted both formatively at each development phase and summatively at the end of the study to assess the quality and effectiveness of the media in improving students English vocabulary mastery within listening skills.

Data collection techniques in this development research employed a questionnaire method. The questionnaire method is a data collection technique consisting of a set of written questions administered to respondents to obtain information related to their opinions, perceptions, knowledge, and behaviors (Salmia, 2023). Questionnaires were used to collect data for validity testing, practicality testing, and effectiveness testing of the learning media. The instrument used in this method was a questionnaire sheet.

Research instruments are tools used to collect data and may take the form of questionnaires, checklists, interview guidelines, observation sheets, tests, or attitude scales (Tabrani et al., 2023; Stantcheva, 2023). The instruments used in this study consisted of questionnaires and observation sheets. Questionnaires were administered during the validity and practicality testing stages by experts and practitioners, while observation sheets were used during the pre-test and post-test to identify improvements in students English vocabulary mastery within listening skills after using the developed learning media. The instrument grids for expert

validation and practicality testing of the interactive audio-visual e-flashcard media are presented in Table 1 for the subject matter expert instrument, Table 2 for the media expert instrument, Table 3 for the teacher practicality test instrument, Table 4 for the individual and small-group trial instruments, and Table 5 for the multiple-choice test instrument.

Table 1. Material Expert Instrument Grid

Aspect	Indicator
Learning Design	1) The learning flow in the media is well structured and supports the achievement of learning objectives
	2) The media are designed to enhance elementary school students vocabulary comprehension
	3) The educational content provided aligns with the learning indicators
Content	1) The organization of learning materials is appropriate to students characteristics
	2) The materials presented have sufficient depth
	3) The learning media support clear material presentation
	4) The materials are easy to understand
	5) The learning media provide alternative learning resources
Visualization	1) The images presented are relevant to the learning content
Language	1) The use of vocabulary is accurate and consistent
Evaluation	1) The test items are aligned with learning objectives
	2) The level of difficulty of the test items corresponds to the learning materials

(Source: Ardana & Yudiana (2024) modified)

Table 2. Media Expert Instrument Grid

Aspect	Indicator
Technical	1) Ease of use of the media by students
	2) Media support in facilitating students understanding
	3) The media provide meaningful and motivating learning experiences
Display	1) Appropriateness of visual size and clarity
	2) Visual design attractiveness in supporting learning
Text	1) Consistency in font usage
	2) Appropriateness of font type selection
	3) Text readability based on font size
Images	1) Image clarity in supporting students understanding
Language	1) Suitability of language used in the learning media
Color	1) Text readability through color and background combination
	2) Image clarity through color and background combination
Audio and Video	1) Utilization of audio to enhance students interest
	2) Utilization of video to optimize students learning
Layout	1) Proper spacing of text placement on cards
	2) Neatness and organization of media elements

(Source: Ardana & Yudiana (2024) modified)

Table 3. Teacher Response Instrument Grid

Aspect	Indicator
Display	1) Attractiveness of the media appearance
	2) Text readability
	3) Clarity of images and text
	4) Color combination usage
Content	1) Materials are easy to understand
	2) Practice exercises are aligned with the materials
	3) Suitability of materials with learning objectives
Operation	1) Ease of using the media
	2) Media can be used repeatedly
	3) Clarity of instructions for using the media

(Source: Ardana & Yudiana (2024) modified)

Table 4. Individual and Small Group Trial Instrument Grid

Aspect	Indicator
Display	1) The learning media display is attractive 2) Text is clearly readable 3) Images are clearly visible 4) Audio is clearly audible 5) Color combinations attract students' attention
Operation	1) The media are easy to open and use 2) The media run properly on devices
Vocabulary mastery within Listening skills	1) The media helps students understand and recognize the meaning of English vocabulary through listening activities 2) The media helps students accurately use the English vocabulary they hear according to the given context
Usefulness	1) The media facilitate students mastery of learning materials

(Source: Ardana & Yudiana (2024) modified)

Table 5. Multiple Choice Test Item Instrument Grid

Learning Outcome	Indicator
Students are able to understand the main ideas of orally delivered information with visual support and use simple vocabulary.	1) Identifying images that match activities such as reading, cooking, or dancing based on a short audio dialogue
	2) Understanding information from simple audio describing activities using verb-ing forms in sentences and locations
	3) Classifying verb-ing vocabulary (e.g., running, cooking, swimming, reading) based on indoor and outdoor activities according to audio input
	4) Determining the meaning of verb-ing verbs in sentences heard through simple audio
	5) Selecting sentences that match the audio and activity images
	6) Rearranging scrambled words into correct simple sentences, e.g., "is / reading / ana / a / book" into "Ana is reading a book," with audio support
	7) Identifying daily activities such as brushing teeth, doing homework, or playing soccer based on video clips
	8) Completing sentences with appropriate verb-ing forms based on image context
	9) Matching verb-ing vocabulary with images of daily activities
	10) Selecting the most appropriate verb-ing sentence to describe activities shown in images or video clips

(Source: Faizah et al., (2021) modified)

RESULTS AND DISCUSSION

The designed prototype is an audio-visual-based interactive e-flashcard learning media presented in the form of a PowerPoint application. This learning media is intended for fourth-grade elementary school students. The audio-visual-based interactive e-flashcard media was developed using the Canva application. The prototype consists of several components, including a cover page, usage instructions, learning competencies, greetings and introduction, the "Let's Watch" e-flashcard, verb-ing materials in the home context, verb-ing materials in the school context, verb-ing materials in public places, the "Let's See the New Words" e-flashcard, the "Let's Sing" e-flashcard, the "Let's Answer" e-flashcard, student identity, and supervisor identity.

The validity test of the audio-visual-based interactive e-flashcard learning media was conducted in October and November 2025. The validators involved in this study consisted of two material experts and two media experts. After obtaining assessments from the expert lecturers, the evaluation data were analyzed using the mean formula to determine the validity index and validity qualification of the audio-visual-based interactive e-flashcard learning media in improving English vocabulary mastery within students' listening skills at the fourth-grade

elementary school level. A summary of the analysis results using the mean formula is presented in Table 6.

Based on Table 6, the audio-visual based interactive e-flashcard learning media obtained a material validity index of 3.29, which falls within the range of $3.26 < X < 4$, and a media validity index of 3.71, which also falls within the range of $3.26 < X < 4$. Therefore, the developed product is categorized as having high validity. This indicates that the audio-visual based interactive e-flashcard learning media possesses a very high validity qualification.

Table 7. Analysis Results Using the Mean Formula

Expert	Item	Assessor		Σx	N	M	Information
		I	II				
Material	12	45	34	79	24	3.71	High Validity
Media	16	58	61	119	32	3.29	High Validity

The practicality test in this development research was reviewed from the perspectives of teachers as learning practitioners and students as users of the learning media. Practicality data of the audio-visual based interactive e-flashcard media were obtained through assessments provided by practitioners and students and were analyzed to calculate percentage scores. Data analysis was conducted by calculating the percentage scores based on assessment sheets completed by experts. The data were then converted into a four-scale table to determine the practicality qualification of the developed media. Based on the analysis results, the average practicality score from practitioners was 94%, the practicality score from individual student trials was 90%, and the practicality score from small group student trials was 94%. According to the practicality score criteria, the average scores obtained by practitioners and students fall within the range of 81–100, indicating that the developed product is classified as very good. Thus, the audio-visual based interactive e-flashcard learning media is considered practical for use with a very good qualification.

The implementation stage of the research aimed to examine the effectiveness of the audio-visual-based interactive e-flashcard learning media in improving English vocabulary mastery within students' listening skills at the fourth-grade elementary school level. The implementation was conducted at SD Negeri 1 Gumbrih by administering a pretest to 22 students as an initial measurement. After the pretest, learning activities using the media were carried out directly in the classroom utilizing an LCD projector. Students accessed the materials through the designed PowerPoint presentation, while the researcher acted as a facilitator by guiding the use of the media and supporting students' understanding of the learning concepts.

Media based learning activities included listening activities, pronunciation and repetition exercises, and practice activities related to the material learned through the audio-visual based interactive e-flashcards. The effectiveness of the media was tested using the Paired Sample T-Test technique. Prior to hypothesis testing, prerequisite analyses were conducted, including normality and homogeneity tests using SPSS software. The normality test results indicated that the significance values of the pretest and posttest were greater than 0.05, demonstrating that the data were normally distributed. The homogeneity test results showed that the data variance was homogeneous, indicating that the data were suitable for further analysis. After meeting both prerequisites, the Paired Sample T-Test was conducted to test the research hypothesis. The analysis results revealed a significance value of less than 0.05, indicating a significant difference between the pretest and posttest results. Therefore, it can be concluded that the use of audio-visual based interactive e-flashcard learning media is effective in improving English vocabulary mastery within the listening skills of fourth-grade elementary school students.

The developed guidelines were subsequently tested in terms of feasibility, practicality, and effectiveness using a questionnaire instrument that had previously undergone feasibility testing. For the feasibility test, this study employed two formulas, namely the Gregory formula for testing the feasibility of material expert instruments, media expert instruments, media practicality tests, and effectiveness instruments. The results of the validity test for the material expert instrument, media expert instrument, practicality, and effectiveness instrument, calculated using the Gregory formula, yielded a validity score of 1.00, which falls into the very high category. This is because each statement item was in accordance with the predetermined grid. Therefore, the instruments were deemed suitable for testing the effectiveness of students' English vocabulary mastery in listening skills.

Validation of the feasibility of the materials and media was carried out by experts with specialized expertise in their respective fields. The results of the expert assessments showed that the developed audiovisual-based interactive e-flashcard learning media obtained a validity index of 3.29 from material experts and 3.71 from media experts, both categorized as high validity. This is attributed to the overall quality of the media content, including an attractive design, appropriate font usage, spacing, colors, and menu layout. An appealing media appearance can increase students interest in using it. This finding aligns with previous studies indicating that presenting material in a concise, clear, and easily understandable manner can enhance students' engagement with learning media (Chisunum & Nwadiokwu, 2024; Hasanah et al., 2024).

After the media validation process, the next stage was to test the practicality of the audiovisual-based interactive e-flashcard learning media. The practicality test was conducted through individual trials and small group trials with students. Individual trials involved three students selected purposively to represent the population characteristics: one high-achieving student, one average-achieving student, and one low-achieving student. Small group trials involved 12 students who had not participated in the individual trials, consisting of four high-achieving students, four average-achieving students, and four low-achieving students. The results of the practicality assessments showed a score of 90% for the individual trial and 94% for the small group trial, both of which fall into the very good category. This indicates that the audiovisual-based interactive e-flashcard media is easy to use, and the material and learning process have been adapted to the characteristics of elementary school students. These findings are consistent with previous research indicating that audiovisual based interactive e-flashcards facilitate students in learning English vocabulary (Putri et al., 2024).

Following the validity and practicality tests, as well as improvements to the developed audio-visual based interactive e-flashcard media, an effectiveness test was conducted with students at SD Negeri 1 Gumbrih, Pekutatan District, Jembrana Regency. The effectiveness test used a multiple-choice test, and the students results were analyzed using the paired t-test (correlated t-test) technique via SPSS software. The analysis revealed a significance value (2-tailed) of 0.000, which is less than 0.05 (5% significance level). This indicates a significant difference in students English vocabulary mastery in listening skills before and after using the audiovisual-based interactive e-flashcard media. Based on these findings, it can be concluded that the media is effective in improving vocabulary mastery in listening skills for fourth-grade elementary school students (Sulaiman & Akidah, 2021). This effectiveness is attributed to the implementation of interactive learning, which facilitates students' understanding of the material and encourages greater student engagement during the learning process.

The implications of this study provide a significant contribution to the development of digital learning media, particularly in the context of English language education at the elementary school level. The findings demonstrate that the developed audiovisual-based

interactive e-flashcard media effectively enhances students vocabulary mastery in listening skills. Conceptually, this study supports the view that the integration of interactive and audiovisual technology in learning can create a more meaningful learning experience. Practically, the media can be used by teachers as an innovative alternative for teaching the interview subtopic, while also expanding the variety of learning media available in schools. However, this study has several limitations, including the availability of supporting devices such as laptops or PCs, smartphones, and LCD projectors, which may not be present in all schools. Additionally, media trials were only conducted in one class using a pre-experimental design, limiting the generalizability of the results. Based on these limitations, it is recommended that future research conduct trials on a larger scale using a more robust experimental design, such as a quasi-experiment with a control group. Furthermore, developing a lighter version of the media that is compatible with simpler devices is necessary to ensure accessibility in schools with limited infrastructure. By addressing these aspects, the developed media is expected to provide a broader contribution to learning practices in various elementary education contexts.

CONCLUSION

Based on the research results, it can be concluded that the development of audio-visual-based interactive e-flashcard learning media produced a prototype consisting of a cover, instructions, competency goals, greetings and introduction, “Let’s Watch” e-flashcards, verb-ing material at home, verb-ing material at school, verb-ing material in public places, “Let’s See the New Words” e-flashcards, “Let’s Sing” e-flashcards, “Let’s Answer” e-flashcards, student identity, and supervising lecturer identity. In terms of validity, the media has met the feasibility standards in both content and design, classifying it as highly valid. Moreover, based on teacher and student responses, the media has proven to be practical, easy to use, and aligned with the learning needs of elementary school students. This audio-visual-based media is designed to enhance students English vocabulary mastery within listening skills, providing a more engaging and effective learning experience.

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