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DEVELOPMENT OF AUGMENTED REALITY–BASED PICTURE CARDS FOR DESCRIPTIVE TEXT LEARNING IN ELEMENTARY SCHOOL

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Abstract

This study aimed to develop and examine the feasibility of augmented reality (AR)–based picture cards for descriptive text learning in Indonesian language instruction at the elementary school level. The study employed a Research and Development (R&D) approach using the Alessi and Trollip model, which consists of planning, design, and development stages. Feasibility evaluation was conducted through alpha testing involving two media experts and two material experts, as well as beta testing through a limited trial with Grade III elementary school students. Data were collected using expert validation questionnaires and student response questionnaires based on a four-point Likert scale, and analyzed descriptively by converting scores into feasibility percentages. The results of media expert validation showed feasibility scores of 66.6% (feasible) and 100% (very feasible), while material expert validation yielded scores of 95.4% (very feasible) and 75% (feasible). Student responses in the beta test reached an overall score of 90.0%, categorized as very feasible, indicating positive perceptions in terms of content clarity, visual display, language, and attractiveness. These findings indicate that the developed AR-based picture cards are feasible and appropriate for use as a learning medium to support the delivery of descriptive text instruction in elementary schools. Although this study did not measure learning effectiveness, the results suggest that AR-based picture cards offer a promising alternative learning resource by providing concrete visual representations that align with descriptive text learning objectives. Future research is recommended to examine the effectiveness of this media through experimental designs and broader implementation contexts.

Keywords: *Learning Media; Augmented Reality; Picture Cards; Descriptive Text; Elementary School*

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A. Introduction

Learning is fundamentally an interactive process among teachers, students, and learning resources within a school environment (Aisyah & Sugesti, 2022; Pasaribu et al., 2025). It is not merely the transmission of information, but a dynamic engagement shaped by multiple factors that influence how students construct understanding and adapt to changes in their learning environment (Sartika, 2022; Widyanto & Wahyuni, 2020). In this regard, instructional media play a strategic role as learning resources that can support teachers in expanding students' access to knowledge and in making learning content more comprehensible and meaningful. Pedagogically and psychologically, learning media help

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learners—especially children—by turning abstract ideas into more concrete representations, thereby reducing difficulty and increasing clarity during learning activities (Bilimbi et al., 2025; Erni Mariana et al., 2024). Media, in its basic sense, functions as an intermediary that facilitates communication and supports instructional processes; in classroom contexts, it becomes an instrument through which messages, concepts, and experiences can be delivered more effectively (Aisyah Fadilah et al., 2023).

Among various instructional media, picture cards remain an attractive and practical option for elementary classrooms because they combine visual cues and brief textual information that can guide students to recognize, recall, and describe objects or phenomena (Annisyah & Eny Munisah, 2025; Putri et al., 2024). Picture cards generally contain images, short text, or symbols that help learners focus on key attributes of an object and connect them to the learning objective. When aligned with thematic content, such cards can facilitate children's comprehension, particularly in language learning tasks that require imagination and concrete depiction (Kristanti et al., 2024). However, in today's digital era, conventional picture cards may no longer fully meet learners' expectations for interactive and engaging learning experiences. Therefore, the development of picture-card media toward digital and interactive formats becomes increasingly relevant, especially to support contextual learning that corresponds to contemporary learning demands.

One promising approach is Augmented Reality (AR), which integrates virtual elements into real-world environments in real time, enabling learners to interact with digital content while remaining anchored in physical objects (Anggraini & Apriana, 2025; Kazlaris et al., 2025). AR has been widely discussed as a learning technology that can enhance learners' cognitive performance by offering rich visualizations and supporting the comprehension of concepts that are otherwise difficult to imagine through text alone (Mustaqim, 2016). In practical terms, AR-based learning media can present objects in three-dimensional (3D) form, allowing students to observe key characteristics more clearly and to connect descriptive language with concrete representations. This capacity is particularly relevant for descriptive-text learning, where students are expected to visualize objects, identify salient features, and express them in accurate and coherent descriptions (Chang et al., 2022).

This need is strongly reflected in the context of Indonesian language learning on descriptive texts at SDN Ujong Kuta, Aceh Besar. Based on preliminary observations and needs analysis conducted with teachers and students, two major problems were identified. First, the use of interactive technology-based media in classroom learning remained limited and had not been optimized. Although teachers employed discussion and question–answer activities and occasionally used learning media, the integration of interactive digital media had not been systematically designed or visualized in a way that matches students' learning needs. Second, learning materials were perceived as less engaging, and students experienced difficulties in understanding and remembering descriptive-text content. As a result, students showed low enthusiasm and limited involvement during instruction. This situation tended to produce a teacher-centered

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learning process and did not fully support the nature of descriptive texts, which require learners to imagine and describe objects concretely and systematically.

In response to these challenges, a more appropriate instructional solution is needed—one that leverages interactive technology while remaining feasible for elementary learning contexts. Accordingly, this study develops AR-based picture-card media as an alternative learning resource for descriptive-text instruction in Grade III at SDN Ujong Kuta, Aceh Besar. In this development context, "development" refers to the systematic process of producing a learning media product, validating its quality through expert review, and testing its practicality through student responses. The AR-based picture cards are designed to help students understand descriptive texts by providing clearer and more concrete object visualizations, thereby supporting engagement and ease of use during learning. Therefore, this study is conducted under the title "Development of Augmented Reality–Based Picture Cards for Third-Grade Students at SDN Ujong Kuta, Aceh Besar."

B. Methods

This study employed a Research and Development (R&D) approach using the Alessi and Trollip (2001) development model, which consists of three stages: planning, design, and development. The focus of the study was to develop and assess the feasibility of augmented reality (AR)–based picture cards for learning descriptive texts in Indonesian language instruction at the elementary level.

The study involved two types of evaluators and a limited group of student users. Product feasibility was examined through two sequential stages:

1) Alpha testing (expert validation): Two media experts, qualified as lecturers/educators with expertise in instructional media and educational technology. Two material experts, with an academic background in Indonesian language content for elementary education.
2) Beta testing (limited user trial): The beta test involved third-grade students at SDN Ujong Kuta, Aceh Besar, who had already learned the descriptive-text topic. The trial was conducted in one classroom meeting, in which students used smartphones alternately to scan the picture cards under teacher guidance.

Data were collected using questionnaires and supporting documentation. The instruments consisted of:

1) Media expert validation questionnaire, covering visual appearance, text readability, technical feasibility, ease of use, and alignment with instructional objectives.
2) Material expert validation questionnaire, covering content relevance, content feasibility, and language appropriateness.
3) Student response questionnaire, covering perceptions of content, visual display, language, and attractiveness/interest.

All questionnaire items were constructed based on instructional media feasibility indicators and used a four-point Likert scale (1 = strongly disagree to 4 = strongly agree).

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Content validity was examined through expert judgement, and differences across validators were used to guide product revision before student try-out.

Data collection was conducted through four techniques: observation, feasibility assessment (alpha and beta), student responses, and documentation. Feasibility assessment data were obtained from expert validation (alpha) and student try-out (beta). Documentation (e.g., photographs) was collected to support reporting of the development and trial process.

Questionnaire data from media experts, material experts, and students were analyzed using descriptive quantitative analysis by converting obtained scores into feasibility percentages.

The feasibility percentage was computed using the following formula:

$$P = \frac{F}{N} \times 100\%$$

where P is the final percentage score, F is the obtained score, and N is the maximum possible score. The resulting percentages were interpreted using a rating-scale feasibility classification adapted from Arikunto (2018): 76–100% (very feasible), 51–75% (feasible), 26–50% (less feasible), and 0–25% (not feasible).

C. Results and Discussion

1. Results

a. Product Development Results

The augmented reality (AR)–based picture cards were developed using the Alessi and Trollip development model, which consists of three stages: planning, design, and development. This section reports the development outputs at each stage, followed by feasibility findings from expert validation and student responses.

Planning Stage (Needs Identification and Scope Definition)

At the planning stage, the development scope was defined for Indonesian language learning on descriptive texts for Grade III students at SDN Ujong Kuta, Aceh Besar. Needs analysis indicated that interactive technology-based media had not been optimally integrated into classroom instruction, and students experienced difficulty understanding and remembering descriptive-text material. As a result, student engagement tended to be low, and learning activities did not fully support the descriptive-text requirement of imagining and describing objects concretely. These findings supported the need for developing an interactive learning medium capable of providing clearer object visualization through AR-based picture cards.

Design Stage (Content Blueprint, Flowchart, and Storyboard)

In the design stage, the product structure was prepared through initial content development and the creation of a flowchart and storyboard. The picture cards were designed to include an object image, a short descriptive text, and an AR marker to trigger

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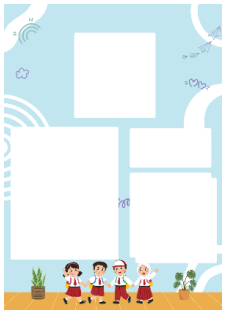
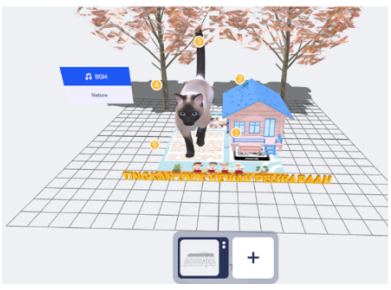
digital content. The flowchart illustrated the operational flow of media use—from scanning the marker with a smartphone to displaying 3D objects—while the storyboard specified the card layout, scanning interface, and 3D visualization as the basis for production.

Development Stage (Production and AR Integration)

During the development stage, the picture cards were designed using Canva, while AR content was developed using Assemblr Edu to display three-dimensional (3D) objects through smartphone devices. The final product allows students to scan picture cards so that corresponding 3D objects appear on the device screen, supporting concrete visualization during descriptive-text learning activities.

Table 1. Steps in Developing AR-Based Picture Card Media

No.	Development Steps
1	Open Canva to design the picture-card media.
2	Create card elements (e.g., color selection, layout, and engaging illustrations). 
3	Arrange the card components, including title area, object image, short descriptive text, and space for the AR marker. The descriptive text is prepared to be short, clear, and in simple language suitable for Grade III students. 
4	Design the AR element using Assemblr Edu.
5	Create 3D objects (e.g., animals and their environments) and descriptive-text content in AR form; the 3D objects are designed to present object features concretely and realistically. 
6	Integrate the QR/marker scanning function so that the 3D object appears when the card is scanned and accessed via smartphone. 

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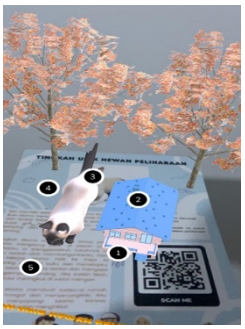
7	Finalize the AR-based picture cards so they are ready for classroom use in terms of visual appearance, content, and AR functionality.	
8	Apply the media by scanning the card with a smartphone camera so that the corresponding 3D object appears virtually on the device screen.	

Source: Researcher-developed data based on the Alessi and Trollip model (2025)

b. Feasibility Testing Results

The feasibility of the developed AR-based picture cards was evaluated through alpha testing (expert validation) and beta testing (student responses). Feasibility judgments were based on percentage scores interpreted using established classification criteria.

Table 2. Feasibility Classification Criteria

Category	Percentage
Very Feasible	76% – 100%
Feasible	51% – 75%
Less Feasible	26% – 50%
Not Feasible	0% – 25%

Source: Arikunto (2018), as adapted in this study.

c. Alpha Test Results: Media Expert Validation

Media expert validation aimed to assess the feasibility of the AR-based picture cards in terms of visual quality, readability, technical functionality, ease of use, and alignment with learning objectives. Two media experts participated in this validation stage.

Table 3. Media Expert 1 Validation Results

Assessment Aspect	Score Obtained	Maximum Score	Percentage	Category

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Visual quality	9	12	75%	Feasible
Text readability	5	8	62.5%	Feasible
Technical feasibility	9	16	56%	Feasible
Ease of use	6	8	75%	Feasible
Relevance to learning objectives	3	4	75%	Feasible
Overall	32	48	66.6%	Feasible

Source: Media expert validation data (Alpha test), 2025.

The results in Table 3 indicate that Media Expert 1 rated the developed media as feasible, with all assessed aspects meeting the minimum feasibility threshold. Although some aspects obtained moderate scores, none fell into the less feasible category.

Table 4. Media Expert 2 Validation Results

Assessment Aspect	**Score Obtained**	**Maximum Score**	**Percentage**	**Category**
Visual quality	12	12	100%	Very Feasible
Text readability	8	8	100%	Very Feasible
Technical feasibility	16	16	100%	Very Feasible
Ease of use	8	8	100%	Very Feasible
Relevance to learning objectives	4	4	100%	Very Feasible
Overall	48	48	100%	Very Feasible

Source: Media expert validation data (Alpha test), 2025.

Table 4 shows that Media Expert 2 rated all aspects at the very feasible level, indicating strong agreement regarding the technical and visual readiness of the developed media.

d. Alpha Test Results: Material Expert Validation

Material expert validation focused on content relevance, content feasibility, and language appropriateness to ensure alignment with Indonesian language learning objectives.

Table 5. Material Expert 1 Validation Results

Assessment Aspect	**Score Obtained**	**Maximum Score**	**Percentage**	**Category**
Content relevance	15	16	93.7%	Very Feasible
Content feasibility	15	16	93.7%	Very Feasible
Language appropriateness	12	12	100%	Very Feasible

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Overall	42	44	95.4%	Very Feasible

Source: Material expert validation data (Alpha test), 2025.

The results in Table 5 indicate that Material Expert 1 evaluated the instructional content and language as very feasible, confirming alignment with curriculum requirements and learner characteristics.

Table 6. Material Expert 2 Validation Results

Assessment Aspect	**Score Obtained**	**Maximum Score**	**Percentage**	**Category**
Content relevance	12	16	75%	Feasible
Content feasibility	12	16	75%	Feasible
Language appropriateness	9	12	75%	Feasible
Overall	33	44	75%	Feasible

Source: Material expert validation data (Alpha test), 2025.

Table 6 shows that Material Expert 2 categorized the media as feasible, indicating that the content met minimum standards and was suitable for classroom use.

e. Beta Test Results: Student Responses

Student responses were collected to examine the usability and attractiveness of the developed media during a limited classroom trial.

Table 7. Student Response Results

Assessment Aspect	**Score Obtained**	**Maximum Score**	**Percentage**	**Category**
Material/content	189	216	87.5%	Very Feasible
Visual display	195	216	90.2%	Very Feasible
Language	193	216	89.3%	Very Feasible
Interest	201	216	93%	Very Feasible
Overall	778	864	90.0%	Very Feasible

Source: Student response questionnaire data (Beta test), 2025.

The results in Table 7 indicate that students perceived the AR-based picture cards as very feasible in terms of content clarity, visual appearance, language use, and interest, demonstrating positive user responses during the trial.

2. Discussion

This study aimed to develop and examine the feasibility of augmented reality (AR)–based picture cards for teaching descriptive texts in Indonesian language learning at the elementary school level. The discussion interprets the development outcomes and feasibility findings by situating them within relevant learning-media theory and prior development studies, while remaining consistent with the feasibility-oriented research design.

The results of the alpha and beta testing indicate that the developed AR-based picture cards fall within the feasible to very feasible categories across media experts,

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material experts, and student responses. From a development perspective, these findings suggest that the product design, content organization, and technical implementation are appropriate for Grade III learners and align with instructional objectives for descriptive-text learning. Differences in feasibility scores among experts are common in development research and reflect variations in evaluators' professional perspectives rather than fundamental design flaws (Khadijah et al., 2022; van den Akker et al., 2012). Importantly, all expert assessments exceeded the minimum feasibility threshold, confirming that the media is suitable for classroom use after minor revisions.

The positive feasibility results can be explained through principles of multimedia learning, which emphasize that learning becomes more meaningful when verbal information is supported by visual representation. Media that combine text and visual elements can help learners process information more effectively by reducing abstraction and increasing clarity (Bilimbi et al., 2025; Mustaqim, 2016). In this study, AR-based picture cards integrate short descriptive texts with three-dimensional (3D) visual objects, allowing students to associate linguistic descriptions with concrete visual forms. This integration is particularly relevant for descriptive-text instruction, which requires learners to imagine object characteristics and translate them into accurate descriptions (Kristanti et al., 2024).

The high level of positive student responses in the beta test further indicates that the developed media is perceived as attractive and easy to use. Students rated the visual display, language clarity, and interest aspects at very feasible levels, suggesting that the AR-based picture cards successfully accommodated learners' characteristics at the elementary level. Previous studies have shown that interactive and visually rich learning media can increase students' attention and motivation during learning activities (Rachma et al., 2020; Wibowo et al., 2022). However, consistent with the research design, this study did not measure learning outcomes. Therefore, the findings should be interpreted as evidence of usability and feasibility, not as proof of instructional effectiveness.

In relation to prior AR-based learning media research, this study contributes by applying AR technology to Indonesian language learning, specifically to descriptive-text material at the elementary school level. Many previous AR development studies in primary education have focused on science or conceptual subjects that rely heavily on object visualization (Gema Rullyana & Rizki Triandari, 2024; Heydemans & Elmunsyah, 2024; Li et al., 2025). By contrast, this study demonstrates that AR can also be adapted to language learning contexts that emphasize description, imagination, and verbal expression. This contextual adaptation strengthens the relevance of AR-based media beyond content-heavy domains and supports its potential use in broader instructional settings.

Despite these contributions, the study has several limitations. The beta test was conducted as a limited trial involving one group of students in a single instructional session, which restricts the generalizability of the findings. In addition, the study did not examine the effectiveness of the media in improving learning outcomes or long-term retention. The use of smartphones as AR devices may also present practical challenges,

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including device availability and potential distraction in classroom environments. Similar constraints have been reported in prior studies on technology-based learning media in elementary education (Wibowo et al., 2022). The discussion confirms that the developed AR-based picture cards are feasible, appropriate, and well received within the study context. By integrating visual interactivity with instructional content, the media offers a promising alternative learning resource for descriptive-text instruction in elementary schools, while further investigation is needed to examine its effectiveness in improving student learning outcomes.

D. Conclusion

This study developed augmented reality (AR)–based picture cards for teaching descriptive texts in Indonesian language learning at the elementary school level using the Alessi and Trollip development model. The development process consisted of planning, design, and development stages, followed by feasibility evaluation through expert validation (alpha testing) and a limited student trial (beta testing). The findings indicate that the developed media achieved feasible to very feasible ratings from media experts, material experts, and students, confirming that the product is appropriate in terms of content organization, visual design, technical functionality, and ease of use for Grade III learners.

The results demonstrate that AR-based picture cards can function as a practical and engaging learning resource to support the delivery of descriptive-text instruction by providing concrete visual representations aligned with brief textual descriptions. Students' positive responses suggest that the media is attractive and user-friendly within the classroom context. However, consistent with the research design, this study does not make claims regarding learning effectiveness or achievement gains. The findings should therefore be interpreted as evidence of feasibility and usability, rather than instructional impact.

Several limitations should be acknowledged. The trial was conducted with a limited number of students in a single learning session, and learning outcomes were not measured. In addition, the use of smartphones as AR devices may present practical challenges related to availability and classroom management. Future research is recommended to employ experimental or quasi-experimental designs to examine the effectiveness of AR-based picture cards on students' learning outcomes, comprehension, and retention, as well as to involve broader samples and longer implementation periods.

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