



Needs Analysis Of 3D AR (Three-Dimensional Augmented Reality) Based Teaching Materials For Descriptive Text For Grade VII Students At SMPN 3 Bungku Selatan SATAP

Emilia B¹, Muh. Tahir², Syamsuddin Syamsuddin³, Gazali Lembah⁴, Sukma Sukma⁵, Juniati Juniati⁶

¹²³⁴ Tadulako University, Jl. Soekarno Hatta Km 09 Tondo, Palu, 94119, Indonesia
emiliabasruddin@gmail.com

Abstract: This study aims to analyze the need for 3D Augmented Reality (AR) based teaching materials for descriptive text at SMPN 3 Bungku Selatan SATAP. A qualitative method was employed, with data collected through interviews and observation. The research participants consisted of two Indonesian language teachers and the seventh-grade students. In the data collection process, three analyses were conducted: a needs analysis to evaluate learning conditions and required learning resources; a facility analysis to identify supporting factors for product development; and a material analysis to assess the content to be developed. Data were obtained through the observation of learning activities, which included teaching devices, the learning process, and student behavior. Interviews with the Indonesian language teachers used a guide covering student characteristics, the curriculum, and teaching materials. The results show that teachers require teaching materials that facilitate student understanding. The currently available materials are generally in the form of textbooks aligned with the curriculum but lack accommodation for the application of concepts and local wisdom. Students' learning resources are limited to conventional print and audio-visual media. Therefore, it is necessary to develop teaching materials that support the 4C competencies (Critical Thinking, Creative Thinking, Collaboration, and Communication) relevant to 21st-century learning. The use of 3D AR technology is expected to enhance students' understanding of the material and encourage active participation in learning.

Keywords: teaching materials, descriptive text, 3D AR, needs analysis.

1. Introduction

The advancement of Information and Communication Technology (ICT) has catalyzed a significant paradigm shift within the educational landscape. Traditional pedagogical models are progressively being supplanted by more interactive, technology-integrated approaches. This transformation is not merely a trend but a necessary response to the challenges of the 21st century, which demand that learners cultivate a robust set of competencies encompassing communication, collaboration, critical thinking, and creativity collectively known as the 4Cs (Kurniawan & Cahyani, n.d.). Within this evolving context, the development of innovative instructional

materials has become imperative for enhancing the efficacy of the teaching and learning process.

Di SMPN 3 Bungku Selatan SATAP, pengajaran In the specific context of SMPN 3 Bungku Selatan SATAP, the instruction of the Indonesian language, particularly in the domain of descriptive text writing, encounters distinct pedagogical challenges. Preliminary observations indicate a discernible pattern of low student engagement and a lack of enthusiasm during lessons, which subsequently correlates with suboptimal comprehension of the subject matter. This finding aligns with the assertion by Imawati (2017) that a positive and engaging learning atmosphere is a critical determinant of student participation. It is therefore evident that there is a pressing need for the development of instructional materials that are not only captivating but also pedagogically aligned with the specific learning needs of the students.

The integration of technology-based learning media, such as Three-Dimensional Augmented Reality (3D AR), presents a promising solution to address these identified challenges. 3D AR technology offers learners an immersive experience, enabling them to visualize objects in a three-dimensional space, thereby transforming abstract concepts into tangible, concrete representations. This study, therefore, aims to conduct a comprehensive needs analysis to investigate the requirement for 3D AR-based instructional materials for teaching descriptive text writing to seventh-grade students at SMPN 3 Bungku Selatan SATAP. The research seeks to establish an empirical foundation for the subsequent design and development of a technologically enhanced learning tool tailored to the local educational context.

2. Review Of Related Literature

2.1 Digital Teaching Materials in the Contemporary Classroom

Digital teaching materials can be conceptualized as a systematic collection of instructional content presented in a digital format, designed to facilitate learning activities. Their adoption is of paramount importance in the current educational era, which is largely populated by 'digital native' learners who are inherently accustomed to interacting with digital media (Depdiknas, 2017; Dick & Carey, 2009). The integration of such materials can optimize learning processes, enhance instructional efficiency, and foster more dynamic and interactive educational environments by shifting the teacher's role from a sole knowledge provider to a facilitator of learning.

According to Prastowo (2013), the development of high-quality digital materials adheres to several key instructional design principles. These include ensuring that titles are directly derived from core competencies, providing clear and unambiguous learning instructions, and presenting supporting information whether textual, graphical, or animated in an engaging manner. Furthermore, effective materials should incorporate interactive tasks, provide mechanisms for assessing student work, and leverage diverse learning resources to enrich the core content.

2.2 The Pedagogical Affordances of 3D Augmented Reality in Learning

Augmented Reality (AR) technology offers a pedagogical approach that fosters highly interactive and engaging learning experiences. By overlaying computer-generated information onto the real world, AR creates an enhanced version of reality that can significantly augment the learning process. The capacity of AR to facilitate the comprehension of complex or abstract material through visualization, as noted by Mutiara et al. (2024), is particularly pertinent to the challenges identified in this study. The implementation of 3D AR is therefore posited to not only enhance student motivation and engagement but also to improve their conceptual understanding of the objects they are tasked to describe by making them tangible and explorable.

2.3 The Nature of Descriptive Text and the Role of Visualization

A descriptive text is a genre of writing that aims to depict an object, place, or event with such detail that the reader can vicariously see, feel, and experience it through the prose (Imawati, 2017). The conventional structure of a descriptive text comprises three key stages: identification, which introduces the object; classification, which categorizes the object; and description of parts, which provides a detailed account of the object's features. To achieve this descriptive effect, writers employ specific linguistic elements, including concrete nouns (e.g., book, table), elaborative sentences that provide detailed information, and figurative language such as personification.

The primary pedagogical challenge in teaching this genre lies in bridging the cognitive gap between a student's conceptual understanding of an object and their ability to articulate its features using rich, detailed language. It is precisely at this nexus that the integration of 3D AR technology, such as the Assemblr EDU platform, offers transformative potential. By providing an immersive, manipulable, and visually rich model of the object, 3D AR can significantly enhance a student's observational capacity, thereby providing a stronger cognitive foundation for composing a detailed and effective descriptive text.

3. Methods

This study employed a qualitative research design, specifically utilizing a case study approach. This methodology was deemed the most appropriate for achieving the research objectives, as it facilitates an in-depth and holistic investigation into the specific context of SMPN 3 Bungku Selatan SATAP. The research was structured around a three-pronged analytical framework designed to comprehensively assess: (1) the pedagogical needs concerning existing learning conditions and required resources; (2) the availability and adequacy of institutional facilities to support product development; and (3) the content requirements for the proposed instructional materials. The ultimate aim of this qualitative inquiry was to establish the feasibility and specific requirements for developing 3D AR-based teaching materials tailored to the identified needs.

The research was conducted at SMPN 3 Bungku Selatan SATAP, a state junior high school located in a specific regional context in Indonesia. The participants for this study were selected through purposive sampling, a technique chosen to ensure that the individuals selected possessed the most relevant knowledge and experience pertinent

to the research questions. The participant group comprised two Indonesian language teachers responsible for seventh-grade instruction and the seventh-grade students themselves. The teachers were selected for their direct professional insights into the curriculum and pedagogical challenges, while the students were included as the primary end-users whose learning behaviors and needs are central to this analysis.

To gather rich and detailed data, a mixed-method qualitative data collection strategy was implemented, utilizing classroom observation and semi-structured interviews. Classroom Observation. Non-participant observations were conducted using a structured observation sheet. This instrument was systematically designed to capture data across three domains: (1) Instructional Artifacts, including the availability and alignment of teaching modules (*modul ajar*) and learning outcome targets (ATP); (2) Pedagogical Processes, covering aspects such as lesson delivery, instructional methods employed, classroom management, student motivation techniques, and assessment strategies; and (3) Student Behavior, documenting engagement levels, participation, and interactions both within and outside the formal classroom setting.

Semi-Structured Interviews. In-depth, semi-structured interviews were conducted with the two participating Indonesian language teachers. An interview protocol was developed to guide the conversations, ensuring all key areas were explored while allowing flexibility for emergent themes. The protocol was structured around three principal topics: (a) Student Characteristics, which included inquiries about class size, academic performance, learning activities, and common pedagogical issues; (b) Curriculum Implementation, focusing on the teaching methods frequently applied and specific topics requiring enhanced instructional materials; and (c) Existing Teaching Materials, which explored the availability, utilization, and perceived effectiveness of current resources, as well as teacher expectations for future material development.

The data analysis process was conducted systematically and thematically. All data collected from observation notes and interview transcripts were transcribed and organized. Subsequently, the data were subjected to a thematic analysis, wherein the researchers coded the data to identify recurring patterns, themes, and key insights related to the three core areas of inquiry (needs, facilities, and materials). The findings from the observations and interviews were triangulated to validate the results and construct a comprehensive, multi-faceted understanding of the existing conditions. This rigorous analysis formed the basis for determining the specific requirements and design considerations for the proposed 3D AR-based instructional materials..

4. Results And Discussion

4.1 Results

4.1.1 Needs Analysis for 3D AR-Based Teaching Materials for Descriptive Text

Hasil wawancara dengan dua guru Bahasa Indonesia The needs analysis revealed a significant disparity between the existing pedagogical practices and the learning requirements for mastering descriptive text composition. In-depth interviews with two Indonesian language teachers consistently indicated that the primary instructional materials are limited to conventional print-based textbooks. A critical deficiency

highlighted by the educators is the lack of visual elements in these materials, which directly impedes students' ability to visualize the objects being described. Consequently, the teachers articulated a pressing need for more engaging and interactive teaching resources to bridge this comprehension gap.

This finding is further corroborated by classroom observations, which demonstrated that the prevailing teacher-centered instructional methods, coupled with limited media use, contribute to low student engagement and enthusiasm. A majority of students exhibited passive behavior during lessons. Furthermore, interview data revealed that while students' quantitative learning outcomes are within an adequate range (65-80), the core pedagogical challenges lie in their diminished motivation and profound difficulty with visualization a cognitive skill essential for the descriptive writing process. The detailed data from these observations and interviews are presented below.

4.1.2 Analysis of Supporting Facilities for 3D AR Implementation

An analysis of the school's infrastructure and student resources indicates a foundational capacity for implementing 3D AR-based learning, albeit with certain constraints. On the institutional level, available resources include LCD projectors, a computer laboratory equipped with 15 Chromebooks, and 30 school-owned tablets. However, their utilization must be systematically scheduled due to the limited quantity relative to the student population. Regarding student-owned resources, a key finding indicates that approximately 40% of students own smartphones with specifications capable of supporting AR applications. This figure is a crucial determinant of the viability of a Bring Your Own Device (BYOD) strategy and highlights a significant accessibility challenge. Nevertheless, the combination of school facilities and personal device ownership suggests that the implementation of 3D AR teaching materials is feasible through strategically designed learning scenarios, as detailed below.

4.1.3 Analysis of Descriptive Text Materials

A content analysis of the existing curriculum materials for seventh-grade descriptive text writing, aligned with the Kurikulum Merdeka's Learning Outcomes (CP), shows that the core competencies involve identifying information, analyzing textual elements, and presenting data descriptively. A primary finding is that the subject matter is presented in a largely abstract manner. Students are expected to discern and detail an object's characteristics solely through textual exposition, lacking the necessary visual scaffolding to translate abstract concepts into concrete mental models, which is a prerequisite for effective descriptive writing.

Table 1 Student Learning Observation Sheet

No.	Aspect Observed	Description of Observation Results
1.	Instructional Artifacts	
	Learning Outcomes (CP)	Available and aligned with the <i>Kurikulum Merdeka</i> .
	Teaching Module (<i>Modul Ajar</i>)	Available but has not yet integrated digital technology.
2.	Pedagogical Processes	
	Opening the Lesson	The teacher opens with a simple apperception.

	Material Presentation	Material is presented through textbooks and verbal explanations.
	Teaching Method	Lecture and group discussion methods are used.
	Language Use	Language is communicative and easy to understand.
	Time Management	Time allocation is in accordance with the teaching module.
	Teacher's Movement	The teacher actively moves around to approach students.
	Method of Motivating Students	Verbal motivation and the provision of rewards.
	Questioning Technique	Utilizes both open-ended and closed-ended questions.
	Classroom Management Technique	Classroom management is reasonably good.
	Use of Media	Limited to textbooks and static images.
	Form of Evaluation	Written tests and assignments.
	Closing the Lesson	The teacher summarizes the material and gives an assignment.
3.	Student Behavior	
	Student behavior inside the classroom	A majority of students are passive and lack enthusiasm in learning.
	Student behavior outside the classroom	Students are active and communicative.

Table 2 Interview Guide for Grade VII Indonesian Language Teachers

No.	Question	Answer
Student Characteristics		
1	What is the total number of students in Grade VII at SMP Negeri 3 Bungku Selatan Satap?	58 students, consisting of 30 in class VII A and 28 in class VII B.
2	From the learning process, what are the learning outcomes achieved by the students?	The average score is adequate, with a range of 65-80.
3	How would you describe the students' learning activities in the classroom?	Students tend to be passive, with limited participation.
4	Based on your observation, what problems frequently occur during classroom learning?	Difficulty in visualizing objects in descriptive texts, lack of learning motivation.
5	What are your hopes for improving learning in the future?	For learning to be more interactive and engaging through the use of technology.
Curriculum		
1	What curriculum is currently implemented at SMP Negeri 3 Bungku Selatan Satap?	<i>Kurikulum Merdeka.</i>
2	What teaching methods are most often applied in the classroom?	Lecture, group discussion, and assignments.
3	Which subject material needs improvement in its process and learning outcomes?	Descriptive text requires more visual learning media.
Teaching Materials		

1	What is the role of teaching materials in the learning activities?	They are very important as a guide for learning.
2	What is the students' response to the currently used teaching materials?	Students feel the materials are uninteresting and difficult to understand.
3	What is the level of learning success using the existing teaching materials?	Reasonably successful, but it needs to be enhanced with more varied media.
4	In line with technological development, what technologies have been used in the classroom?	LCD projector, learning videos from YouTube.
5	In your opinion, can the use of technology in learning improve its quality?	It can improve the quality of learning and student motivation.
6	What Indonesian language material is most in need of technology for its presentation?	Descriptive text critically requires object visualization.
7	Have you ever heard of or known about 3D AR?	I have heard of it but have never used it.
8	How would you respond if a teaching material for descriptive text was made in 3D AR?	Very positively, and I hope it can be implemented.
9	What are your hopes regarding the development of 3D AR media for descriptive text?	That it can help students understand the material better and increase their interest in learning.
Facilities		
1	Does the school have adequate resources to support the use of technology in learning?	The school has resources like an LCD projector and a computer lab, though the quantity is still limited. Internet is available, but the speed is not optimal for all classes.
2	Do students have the supporting facilities for the implementation of 3D AR materials?	Approximately 40% of students own a smartphone that supports AR applications.
3	Does the school have supporting facilities for the implementation of 3D AR materials?	The school has a computer lab with 15 Chromebooks and 30 school-owned tablets that can be used for technology-based learning. However, these devices must be used in rotation.

Tabel 3 Results of Facility Analysis

No.	Facility Aspect	Analysis Results
1	School resources	The school has LCD projectors, but the quantity is limited for all classes.
2	Facilities owned by students	Approximately 40% of students own a smartphone that supports AR applications.
3	Facilities owned by the school	There is a computer lab with 15 Chromebooks and 30 school-owned tablets; internet is available but with limited speed.
4	Infrastructure readiness	The infrastructure is reasonably supportive, although there are some limitations regarding device access.

4.2 Discussion

4.2.1 The Imperative for Developing 3D AR-Based Teaching Materials

The research findings collectively underscore a compelling imperative for pedagogical innovation in the teaching of descriptive text at SMPN 3 Bungku Selatan SATAP. The prevailing reliance on conventional methods and visually sparse textbooks, as identified in the needs analysis, directly correlates with the observed student passivity and comprehension difficulties. This is not merely an issue of student motivation but points to a deeper cognitive disconnect. Descriptive writing demands a high level of visualization and spatial reasoning, skills that are difficult to cultivate when the primary learning tool the textbook is abstract and non-interactive. The observed passivity can thus be interpreted as a symptom of the cognitive overload students experience when asked to construct detailed mental images from text alone. This situation aligns with the scholarly discourse, such as that of Prabowo (2020), which emphasizes the necessity of developing teaching materials that are congruent with student needs and contemporary technological advancements.

The use of 3D AR technology emerges as a highly pertinent solution to this specific cognitive challenge. As elucidated by Mutiara et al. (2024), AR media possess the unique capability to render difficult concepts more intelligible through visual and interactive means. By allowing students to observe three-dimensional objects from multiple perspectives, rotate them, and examine their textures and components, this technology directly offloads the cognitive burden of visualization. It transforms abstract concepts from the text into concrete, manipulable experiences. This immersive approach is particularly relevant for the genre of descriptive text, which fundamentally relies on strong visualization skills to generate rich adjectival phrases and precise spatial descriptions. The observed lack of student engagement, therefore, can be reframed not merely as a lack of interest, but as a direct consequence of the pedagogical limitations of the current materials, necessitating an intervention like 3D AR to foster a more dynamic and effective learning environment.

4.2.2 Strategies to Mitigate Facility and Accessibility Constraints

While the potential of 3D AR is substantial, its successful implementation is contingent upon strategically addressing the identified infrastructural and accessibility challenges. The issue of limited technological access, starkly underscored by the 40% smartphone ownership rate, and the need for teacher preparedness are critical implementation barriers. This ownership rate highlights a significant digital divide within the student population, making a sole reliance on personal devices inequitable. The research by Zawacki-Richter et al. (2019) highlights the paramount importance of professional development for educators, moving beyond mere technical training to focus on pedagogical integration. Consequently, the design and implementation of a continuous training program for teachers is a prerequisite. This program must equip them with the competence and confidence to not only operate the technology but also to design learning activities that leverage AR's unique affordances effectively.

To address the digital divide among students, a multi-pronged strategy is necessary. The 40% ownership rate dictates that a primary strategy must involve collaborative, group-based learning, where students share a single device. This model transcends its practical necessity, offering pedagogical benefits such as fostering peer-to-peer teaching, negotiation of meaning, and collective problem-solving, thereby inherently promoting collaboration, a key 21st-century skill. Concurrently, the systematic utilization of school-owned facilities, such as the computer lab with its Chromebooks and tablets, must be integrated into the instructional design through scheduled rotations. This ensures equitable access for all students. Furthermore, to overcome infrastructure limitations, the 3D AR materials themselves should be developed with low technical specifications to ensure compatibility with a wider range of simpler devices and, ideally, should be designed to be accessible offline after an initial download to circumvent the school's inconsistent internet connectivity.

4.2.3 Implications for the Development of Teaching Materials

The synthesis of findings from the needs, facility, and material analyses provides several key implications for the design and development of the proposed 3D AR teaching materials. First, the principle of curricular alignment and contextualization is paramount. The content must not only adhere to the *Kurikulum Merdeka* but also deeply integrate local wisdom and culture (*kearifan lokal*). For instance, instead of generic objects, the AR models could represent local fauna, traditional houses, or historical landmarks of the Bungku Selatan region. This contextualization makes learning more meaningful, fosters cultural pride, and leverages students' existing schemas, thereby enhancing comprehension and retention.

Second, the instructional design must embody principles of effective digital learning, as advocated by Prastowo (2013). This includes ensuring clarity of instructions, intuitive navigation, and a high degree of interactivity that encourages active student engagement rather than passive consumption. The materials should be scaffolded with interactive tasks and prompts such as virtual "hotspots" on an object that reveal descriptive vocabulary or challenges that ask students to compare and contrast different objects that guide students through the descriptive process from observation to articulation.

Finally, an iterative cycle of development and evaluation is crucial for success. As supported by the findings of Alharbi (2021), systematic evaluation enhances the quality of instructional materials and subsequently improves student learning outcomes. This process should involve more than a one-time test; it necessitates a feedback loop incorporating usability testing with small groups of students, pilot studies in the classroom, and in-depth feedback sessions with teachers. Therefore, pilot testing and gathering feedback from both teachers and students must be an integral part of the development lifecycle to refine the materials, ensuring they are not only technologically functional but also pedagogically effective and truly usable within the specific, resource-constrained context of the school.

5. Conclusion

Based on the results of this study's analysis, it is shown that there is a significant need for 3D AR-based teaching materials for descriptive text at SMPN 3 Bungku Selatan SATAP. Although there are challenges in its implementation, particularly related to technology access and teacher training, the potential of using AR to enhance the student learning experience is substantial. Therefore, collaboration among various stakeholders including teachers, students, and technology developers is essential to create effective and relevant teaching materials. Thus, the use of 3D AR technology is expected to improve the quality of education and support students in achieving the competencies expected in 21st-century learning.

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