



# Mobile Augmented Reality Storybook Embedded with Local Wisdom: A Needs Analysis of Primary Students in Learning English

Asih Rosnaningsih<sup>1</sup>, Asep Muhyidin<sup>2</sup>, Sholeh Hidayat<sup>3</sup>, Yudi Juniardi<sup>4</sup>

<sup>1,2,3,4</sup> Doctoral Program in Education, Universitas Sultan Ageng Tirtayasa, Banten

Corresponding E-Mail: [asihrosna@gmail.com](mailto:asihrosna@gmail.com)<sup>1</sup>, [muhyidin21@untirta.ac.id](mailto:muhyidin21@untirta.ac.id)<sup>2</sup>,  
[sholeh.hidayat@untirta.ac.id](mailto:sholeh.hidayat@untirta.ac.id)<sup>3</sup>, [yudi.juniardi@untirta.ac.id](mailto:yudi.juniardi@untirta.ac.id)<sup>4</sup>

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## Abstract

This research investigated the development of a Mobile Augmented Reality (MAR) English storybook embedded with local wisdom to support English learning in primary schools. It focusses to analyse the necessities, lacks, and wants of students and teachers regarding technology-based learning media and to design a preliminary concept of a MAR storybook appropriate for young learners. A qualitative needs analysis was conducted with 50 fourth-grade students and 2 English teachers in primary school in Serang City, Banten Province, Indonesia. Data were collected through questionnaires, interviews, and classroom observations to examine students' learning habits, teachers' perspectives, and classroom challenges. The results showed that the majority of students (52% are accustomed to using smartphones, 57% are very familiar with technology, 67% like story-based learning, and 76% are enthusiastic about interactive animation) and teachers need contextual, interactive, and easily accessible learning media, while the shortcomings due to limited infrastructure, teacher training, and the dominance of memorization methods. As a solution, a pre-designed MAR storybook was developed based on Bantenese folktale with simple text, illustrations, audio, AR animation, as well as vocabulary, pronunciation, reflective quizzes, and critical question features in a lightweight, child-friendly application that can be accessed online and offline.

**Keywords:** *English language learning; storybook; local wisdom; Mobile Augmented Reality; Primary school students*

## Introduction

The development of digital technology in the 21st century has brought significant changes to the world of education (Gilmore, 2017). The presence of mobile devices such as smartphones and tablets, now very familiar to children, presents a significant opportunity for the education sector to develop more innovative, interactive learning media that are tailored to the characteristics of digital-age learners (Meyers et al., 2013). Primary school students, as digital natives, tend to adapt more easily to technology-based media than to conventional media. This aligns with the mandate of the Independent Curriculum (Kasman & Lubis, 2022) which emphasizes the importance of strengthening the Pancasila Student Profile (Yuzianah et al., 2023), particularly in critical thinking and creativity, as well as digital literacy skills as mandatory 21st-century competencies for students (Badan Standar, n.d.). However, the reality on the ground shows that English language learning in primary schools still faces a number of complex challenges.

In Indonesian primary schools, English language instruction is still primarily introductory, emphasizing fundamental grammar, everyday idioms, and simple vocabulary (Oktavia et al., 2023; Sya & Helmanto, 2020). Despite the Independent Curriculum's focus on 21st-century skills such as creativity, critical thinking, and digital literacy, English instruction in many primary schools still emphasizes memorizing grammar rules and vocabulary (Azzahra, 2024; Nisa et al., 2024). Classrooms often lack creative and contextual learning media, and many teachers have limited training in English pedagogy. As a result, lessons fail to match the developmental needs of young learners who require engaging, interactive, and meaningful approaches (Sintadewi et al., 2020; Suryanto & Sari, 2021). This mismatch frequently leads to boredom, reduced motivation, and suboptimal learning outcomes. Learning materials that are far removed from children's experiences makes it difficult for them to grasp the meaning of the stories, thus diminishing their emotional and cognitive engagement in the learning process (He & Li, 2023).

However, the use of stories based on local wisdom has been proven to be more effective in improving comprehension, strengthening emotional connection, and fostering pride in one's own culture. The focus is overwhelmingly on mastering linguistic aspects, while there is little room for analysing, evaluating, or solving problems through stories. Based on these conditions, innovations in English learning are needed that are not only engaging and interactive but also contextualized to students' lives through local wisdom, while simultaneously fostering critical thinking skills from an early age (Syahfitri, 2024). In this context, Mobile Augmented Reality (MAR) technology presents itself as an innovative solution. AR can combine the real world with virtual objects, creating a more vivid, interactive, and enjoyable learning experience. With MAR, story characters can "come to life" through 3D animations, sounds, and visual effects that appear when

scanned with a mobile device. Children no longer simply read text but can interact with the characters and storyline in greater depth (Oranç & Küntay, 2019).

Folktales are a form of local wisdom that serve as a medium for education, entertainment, and the transmission of cultural values to the younger generation (Cahya & Syafrizal, 2022). In Bantenese famous folktales such as “The Origin of Panaitan Island”, “The Legend of Gunung Karang”, and “Queen Shima of Banten Girang” contain moral messages, religious values, and social wisdom relevant to the daily lives of the community (Fitriani & Yuliana, 2021). According to Sibarani (2018), local wisdom plays a crucial role in building cultural identity, shaping children's character, and fostering pride in their local culture. When integrated into English learning, Bantenese folktales serve not only as a means of language learning but also as a vehicle for introducing local cultural values to children. Previous studies showed that the use of local wisdom-based folktales in children's learning can increase students' language skills, emotional engagement, and motivation to learn because students feel connected to the story content (Enni et al., 2024; Jitpranee et al., 2024; Songsirisak et al., 2024; Yakumbu et al., 2025).

The integration of local wisdom into English learning process in the classroom is important because it connects the classroom to the experiences of students' everyday lives. Incorporating local values, stories, and cultural traditions into the classroom helps children develop their identity, character, and sense of cultural pride in addition to gaining academic knowledge (Mustafa, 2020). This is in line with the national education goals, which place a strong emphasis on creating students who fit the Pancasila profile that is, a generation that is religious, moral, and has a global viewpoint without losing their cultural origins. In the context of teaching English, local knowledge can be used as pertinent material to help children learn a foreign language in a setting that is familiar to them. This makes learning more meaningful and helps to preserve local culture (Anwar et al., 2020; Arsal et al., 2023).

Mobile Augmented Reality (MAR) is a technology-based learning innovation that can interactively combine the real world with virtual objects through mobile devices such as smartphones or tablets. In the context of learning English as a Foreign Language, MAR can provide a more immersive and contextual learning experience, helping students grasp language concepts and concepts through realistic visualizations (Hsu, 2017a). Previous studies have proven that MAR can be integrated as a learning medium in English language learning in the classroom.

According to (Akçayır & Akçayır, 2017), the use of AR in education can increase student motivation, engagement, and understanding of abstract concepts by providing a multisensory experience. Similarly, (Ibáñez & Delgado-Kloos, 2018) emphasize that MAR in language learning encourages active engagement, greater interaction, and the development of critical thinking skills. By presenting English stories visualized through AR, students not only read the text but also view animations, listen dialogues, and interact with the content, ultimately

strengthening their language and digital literacy skills (Şimşek & Direkçi, 2023).

The use of Mobile Augmented Reality in English storybooks has several advantages based on the result of previous studies (Al-Ali et al., 2016; D. Chen et al., 2011; Vate-U-Lan, 2012). First, it can improve students' critical thinking skills by providing a learning experience different from traditional printed books. Second, MAR allows for interactivity; for example, students can press virtual buttons to hear pronunciations, repeat character dialogue, or answer critical questions that arise during the story. Third, by integrating local wisdom into stories, students can learn English while strengthening their cultural identity. Furthermore, MAR can also be designed to stimulate students' critical thinking skills (Demircioglu et al., 2023; Faridi et al., 2021). For example, through the interactive question feature at the end of the story, students are encouraged to analyze the characters' actions, propose alternative solutions, or make decisions based on the storyline. Thus, storybooks serve not only as a language learning medium but also as a means of practicing higher-order thinking skills (HOTS).

The purpose of this research is to conduct a need analysis for developing a Mobile Augmented Reality (MAR) English Storybook integrated with Banten local wisdom for primary school students. This need analysis focuses on identifying the necessities, lacks, and wants of both students and teachers regarding contextual and interactive English learning media that match 21st-century learners. The findings are expected to provide a solid basis for designing an MAR storybook that not only improves English skills but also fosters critical thinking and strengthens cultural identity through local folktales.

Despite the enormous potential of MAR in education, research developing mobile MAR English storybooks based on local wisdom for primary school students remains very limited. Most MAR research in education focuses on science or mathematics, while its integration into language learning particularly English for children is still rare (C.-H. Chen et al., 2016; Cheng & Tsai, 2013). Thus, there is still a research gap in the development of MAR English Storybook which combines technology, local wisdom, and English language learning as an innovative learning model that is culturally relevant and appropriate to student characteristics. Even fewer studies combine aspects of local wisdom, MAR, and critical thinking in a single product development. Based on the above issues, the research questions are as follows:

1. What is the necessity, lacks, and wants of students and teachers for Mobile Augmented Reality-based English storybook embedded with local wisdom for primary students in learning English?
2. What kind of Mobile Augmented Reality English storybook that suits the characteristics of primary school students and embedded with local wisdom values?

## **Method**

This research employed a qualitative research approach with a need's analysis design. The qualitative approach was chosen because it allows for in-depth exploration of students' and teachers' perceptions, experiences, and needs related to the development of a Mobile Augmented Reality (MAR) English Storybook based on local wisdom. The needs analysis focused not only on quantitative data but also on a contextual understanding of how students learn, what they find meaningful, and the challenges teachers face in English language learning (Khasinah & Elviana, 2022). (Richards, 2015) states that needs encompass the meaning of wants, desires, demands, expectations, motivations, lacks, constraints, and requirements. Richards defines language learning needs as a language deficiency, namely the difference between what students can currently do and what they should master.

Meanwhile, Hutchinson and Waters divided needs into two: (1) necessities, namely what students must do in target situations, and (2) learning needs, namely what students must do in the learning process, and (3) wants, namely description of students' needs based on their objective data related to themselves and their environment (Puspita & Rosnaningsih, 2019, 2023). In English language learning, a needs analysis of students' needs is crucial, not only for designing teaching materials but also for determining the direction and expectations of future learning. Therefore, needs analysis is crucial in English learning, especially regarding the needs of English learners for specific purposes.

The participants consisted of 50 fourth grader students from two classes (IV-A were 25 students and IV-B were 25 students) at state primary school in Serang City Banten Province, Indonesia. A purposive sampling technique was used to select participants. The reason of choosing students from fourth grade in age between 10-11 years old; their developmental stage where language skills and critical thinking begin to form. Moreover, students at that level already have basic English language skills and have a basic or familiarity with technological tools or the integration of learning aids. To add, 2 English teachers were also purposively selected based on their teaching experience and familiarity with current curriculum requirements. They had teaching experience and understanding of the implementation of the Independent Curriculum in schools and the teachers selected were innovative teachers (Guru Penggerak) who were quite active in school activities.

Table 1. Need Analysis Components

No.	Need Analysis	Descriptions	Instruments
1.	Necessity	The inquiry emphasized their learning habits, level of technology familiarity, and interest in story-based learning, perspectives on digital learning tools, and preparedness to integrate Mobile Augmented Reality (MAR) in learning English.	Close-ended questionnaires
2.	Lacks	Challenges in implementing technology-based learning materials, perceptions of modern English teaching methods, and classroom difficulties.	Semi-structured interview
3.	Wants	Students' aspiration, motivations, or preferences regarding the Mobile Augmented Reality (MAR) in learning English.	Non-participant observation

Table 2. Questionnaire Blueprints

No.	Students and Teacher Necessities	Statements (+)	Statements (-)
1	Learning Habits	1, 3	2, 4
2	Level of technology Familiarity	5, 7	6, 8
3	Interest story-based learning	9, 11	10, 12
4	Perspective on digital learning tools	13, 15	14, 16
5	Preparedness to integrate MAR	17, 19	18, 20
	Total Item	10	10

Table 3. Interview Blueprints

No.	Students and Teacher Lacks	Questions
1	Challenges in teaching and learning English in classroom	1, 2
2	Perception of teaching english in digital age (modern technology)	3, 4
3	Students' difficulty in English materials and practices	5, 6
	Total Item	6

The data in this study were collected using three main instruments to ensure triangulation and obtain comprehensive findings (Lemon & Hayes, 2020). Semi-structured interviews were conducted with teachers to gather in-depth information regarding their perceptions of current English learning practices, the challenges they face in the classroom, and their expectations of integrating MAR as technology-based learning media. In addition, questionnaires were distributed to both students and teachers using closed-ended questions. For students, the questionnaire focused on learning habits, familiarity with technology, and preferences for story-based learning, while for teachers, it explored their readiness to adopt Mobile Augmented Reality, perceptions of digital learning resources, and views on fostering critical thinking in English learning.

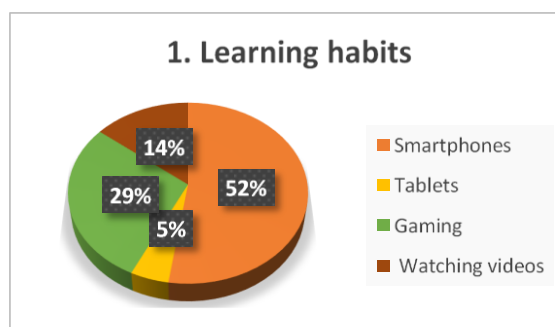
Furthermore, classroom observations were carried out to the current practices of English teaching and learning. The field notes highlight the teaching strategies employed, the level of student engagement, and the use of digital media in class. Lastly, the data obtained then being analyzed using Miles and Huberman's model which consists of three steps namely: data reduction, data display and drawing conclusion (Khoa et al., 2023; Sugiyono, 2011). This data analysis process is interactive and continuous to ensure all the data is well interpreted and to get deeper understanding from the research result.

## **Results**

### **1. Teachers' and Students' Necessity, Lacks, And Wants**

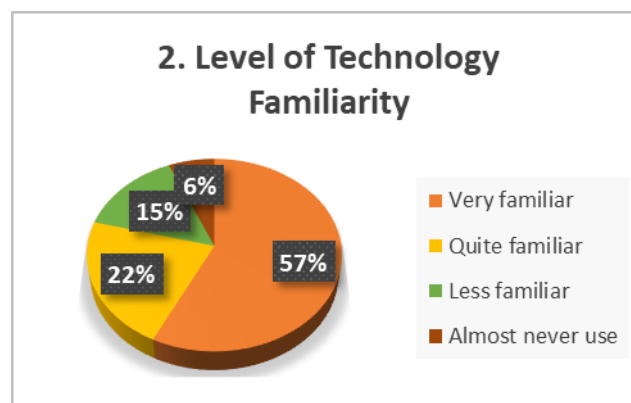
#### ***Necessities***

To provide a clearer picture of students' necessities, lack, and wants in learning, a questionnaire was distributed to students and teachers. The results of this questionnaire are presented in picture 1- picture 5, which includes important domains related to learning habits, level of familiarity with technology, interest in story-based learning, views on the use of digital media, and readiness to integrate Mobile Augmented Reality (MAR) into the learning process. This data is expected to serve as a basis for designing learning strategies that better suit students' and teacher necessities:



Picture 1. Students and Teacher Necessity in domain of learning habits.

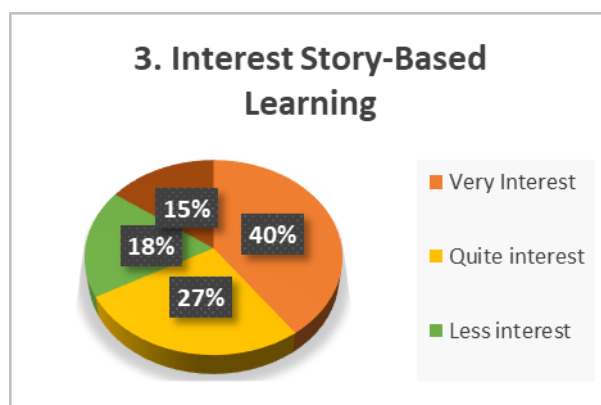
Based on the picture 1 above, from the domain of Learning Habits aspect, it can be explained that the majority of students (52%) are accustomed to using smartphones in their learning activities and daily life. As many as 29% of students use gaming as part of their digital habits, while 14% of students watch videos more often. Only a small portion, namely 5% of students, are accustomed to using tablets. This data shows that smartphones are the most dominant and familiar device for students, so they have great potential to be utilized in the development of technology-based learning media. Conversely, the low use of tablets indicates that these devices are less popular or have limited access among primary school students.



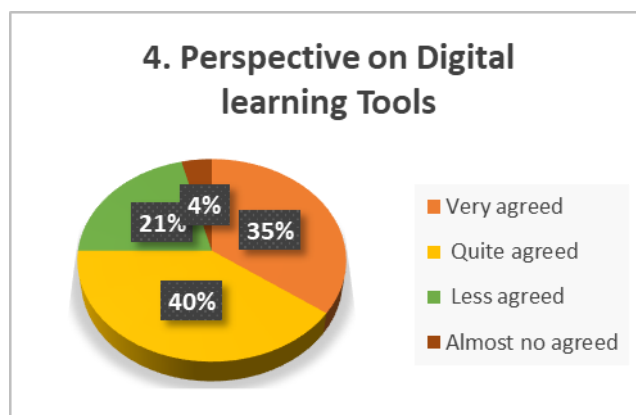
Picture 2. Students and Teacher Necessity in domain of level of technology familiarity

Based on the picture 2 above, from the domain of Technology Familiarity, it can be seen that the majority of students (57%) feel very familiar with technology. As many as 22% of students feel quite familiar, while 15% of students are only slightly familiar. Only a small portion, namely 6% of students, almost never use technology. This data shows that the majority of primary school students are accustomed to using digital devices in their daily lives. This high level of familiarity presents great potential for utilizing technology, especially Mobile Augmented Reality (MAR), in English learning. However, there are still a small number of students who need more guidance to keep up with the use of technology-based learning media.

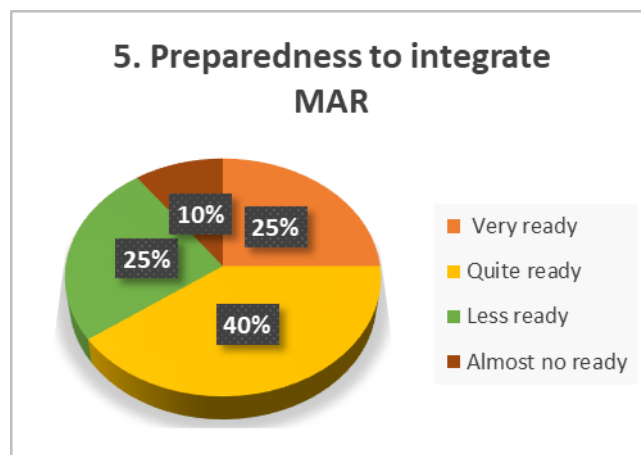




Based on the picture 3 above, from the domain of Interest in Story-Based Learning pie chart, it can be seen that most students showed a high level of interest in story-based learning. As many as 40% of students stated they were very interested, while 27% were quite interested. Only 18% of students stated they were not very interested, and 15% stated they were almost not interested. This data shows that the majority of students prefer a story-based learning approach over traditional methods, because stories usually present interesting contexts, vivid visuals, and connections to everyday experiences. This finding provides an important basis for the use of media such as Mobile Augmented Reality (MAR) storybooks to be relevant to the needs and interests of primary school students.



Based on picture 4 above, from the domain of the Perspective on Digital Learning Tools, it appears that the majority of respondents have a positive view of the use of digital learning media. Forty percent of respondents somewhat agree and 35% strongly agree that digital media is beneficial for learning. Meanwhile, 21% of respondents only slightly agree, and only 4% stated that they almost disagree. This data indicates a high level of acceptance of technology-based learning innovations among both students and teachers. These findings also confirm that the development of Mobile Augmented Reality (MAR) storybooks has great potential for implementation, although a small portion still needs more socialization or guidance in their use.



Based on the picture 5 above, from the domain of Preparedness to Integrate MAR, it appears that most respondents are ready to use Mobile Augmented Reality (MAR) in their learning. Forty percent of respondents stated they were quite ready, and 25% stated they were very ready. However, 25% of respondents still felt less ready, and 10% stated they were almost not ready. This data indicates great potential for implementing MAR in English learning in primary schools, but adequate guidance, training, and facilities are still needed so that all students and teachers can use it optimally.

### **Lacks**

The interviews revealed several teachers' lacks and challenges in the current practice of English learning in primary schools. One of the questions given to the English teacher revealed that English learning situations are still dominated by rote memorization of vocabulary and grammar exercises, with limited opportunities for interactive activities. Below are the quoted interview results between researcher and teachers:

Interviewer: *"What are several challenges in implementing technology-based learning media?"*

Interviewee: *"Some challenges include limited interactive classroom activities due to teacher's technical problems, students were still learning using conventional method focusing on grammar and memorization of sentence pattern."* (Teacher A1)

Next questions aimed to narrate the teachers' perception of teaching English in digital ages. Here is the quoted interview:

Interviewer: *"How are the perceptions of modern English teaching methods?"*

Interviewee: *"Most teachers and students view them positively because they make learning more interactive, engaging, and practical, though some still feel unsure due to unfamiliarity."* (Teacher A2)

Last question intended to explain the kinds of classroom difficulties faced by

teacher in implementing technology in English teaching and learning practice. The teacher's answered:

Interviewer: *"What kind of classroom difficulties faced by teacher and students in implementing technology-based in English classroom?"*

Interviewee: *"Teachers struggle with media planning and design due to limited training and time allotment. However, implementing the independent curriculum requires teachers to be creative and should create learning media that meets students' needs even school's infrastructure sometimes does not support. From the students' perspective, they had struggled with limited vocabulary, low confidence in speaking, difficulty understanding grammar, and lack of practice outside the classroom. (Teacher A2)*

Based on the interview excerpts above, it can be concluded that English language learning in elementary schools still faces various challenges, both from the perspective of teachers and students. Nevertheless, teachers and students have positive perceptions of modern, more interactive and engaging teaching methods to improve the quality of English learning.

### **Wants**

Observation conducted to describe the teaching and learning activities of English in the classroom. The researched wrote field notes several important aspects which might enhance the quality of English learning according to teacher and students' perspectives. Below are the results of the field notes:

Table 4. Students and Teacher Wants

No.	Observed Activities	Field Notes
1.	Students' aspiration	Many students were seen to be active in classroom. They were willing to improve their English skills and be more confident in expressing ideas.
2.	Students' motivation	Motivation rose when teaching and learning activity involves visuals, games, or interactive activities.
3.	Students' preference of MAR in learning English	At the first-time experience, most students enjoyed using Mobile Augmented Reality (MAR) because it feels fun, modern, and helps them understand lessons better.

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4.	List of folktales (local wisdom stories)	Students showed interest in three stories such as “The origin of Panaitan Island”, “The origin of Pandeglang”, “The legend of Mount Karang in Pandeglang”, “The Tale of Ciomas”, and “Ratu Shima of Banten Girang”.
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Based on the Table 4 above, it can be inferred that students expressed strong motivation toward the idea of using interactive storybooks with augmented reality features. Students stated that they preferred learning English through animated stories with sound and visual effects, as it made learning “fun” and “less boring.” Teachers also expressed interest in adopting Mobile Augmented Reality in English storybooks, provided that the materials are aligned with the curriculum, easy to use, and accessible both online and offline. Importantly, teachers believed that MAR storybooks with embedded critical thinking questions would encourage students not only to memorize but also to analyze and reflect on the content.

## 2. The Pre-Design of Mobile Augmented Reality English storybook

The pre-design stage focuses on planning the structure, content, and features of the Mobile Augmented Reality English storybook before its development. This stage combines three main components such as technology, pedagogy, and cultural content. The pre-design of the Mobile Augmented Reality English storybook begins with identifying the main purpose of the product. The storybook is intended to support primary school students in learning English through engaging, interactive, and culturally relevant content. Unlike conventional textbooks, this design aims to make learning enjoyable while also strengthening students’ connection to their local culture.

At the same time, it seeks to enhance essential skills such as vocabulary mastery, listening comprehension, speaking practice, and critical thinking. The second step focuses on the selection of content. Local folktales from Banten, such as *The Origin of Pandeglang*, *The Legend of Mount Karang*, and *The Tale of Ciomas*, are chosen because they contain moral lessons and cultural values that are meaningful for children. These stories are simplified into age-appropriate English while retaining their narrative essence. Important vocabulary, simple dialogues, and comprehension prompts are embedded throughout the stories to ensure that students can follow along and gradually build their language skills (Basal et al., 2016; Candarli, 2023; Pratama & Hadi, 2023).

The third aspect of the design is the storybook layout. Each page presents a balance of text and colourful illustrations to capture children’s interest. Certain icons or QR codes function as AR markers, allowing students to scan them with their mobile devices. Once scanned, characters, objects, or scenes from the story

appear in animated form. This integration of text, visuals, and augmented reality ensures that children are not only reading but also experiencing the story. The fourth design element emphasizes the augmented reality features themselves. Characters in the stories are brought to life through 3D animations, sound effects, and voice narrations. Students can tap icons to hear correct pronunciation, repeat phrases, or even join in simple conversations with the characters. Interactive features such as decision-making prompts or short critical questions are also embedded to stimulate higher-order thinking skills, encouraging students to reflect rather than just memorize (Al-Ali et al., 2016; Kustyarini et al., 2020).

The fifth consideration is the user experience. Since the target users are children, the interface must be simple, intuitive, and visually appealing. The design prioritizes bright colours, cartoon-like graphics, and easy navigation buttons. The mobile application is planned to be lightweight, compatible with most Android devices, and able to function both online and offline. This ensures accessibility for students with varying levels of internet connectivity and device availability.

Finally, the pre-design includes evaluation features to measure learning outcomes. At the end of each story, short vocabulary games, pronunciation drills, and reflective questions are provided. These not only check comprehension but also reinforce learning in an enjoyable way. By combining traditional storytelling with interactive AR experiences, the pre-design of the MAR English storybook offers an innovative model that integrates language learning, cultural identity, and 21st-century skills. To ease for understanding the result of this research, below are the key findings found based on the table 5.

Table 6. Research Key findings

No.	Components	Summary
1	Need Analysis:	
	a. Necessities	Students are familiar with smartphones, they were very familiar with technology, and they preferred story-based and visual learning. Teachers believed MAR storybooks had the potential to improve motivation and language skills.
	b. Lacks	Learning was still dominated by memorizing vocabulary and grammar, with a lack of contextual digital media; limited infrastructure, teacher training, and device access; students struggled with vocabulary, had low speaking confidence, and have minimal practice.
	c. Wants	Students preferred animation, sound, and interactivity; motivation increases when visuals, games, or interactive activities are included. Teachers wanted media that is curriculum-aligned, easy to use, and accessible both online

		and offline.
2	Pre-design of MAR Storybook	<ul style="list-style-type: none"> <li>a. Bantenese folktales (The Origin of Pandeglang, The Tale of Ciomas) are selected as the main content, packaged in simple text, illustrations, audio, and AR animation.</li> <li>b. Key features: vocabulary practice, pronunciation, reflective quizzes, and critical thinking questions.</li> <li>c. Application design: lightweight, child-friendly, and can be used both online and offline.</li> </ul>

## Discussion

The findings of this research provide a clear illustration of the necessities, lacks, and wants of primary school students and teachers regarding the use of Mobile Augmented Reality storybooks embedded with local wisdom in learning English. The results highlight several important aspects that should be discussed in depth, namely students' familiarity with technology, their strong preference for story-based and visual learning, teachers' positive perceptions of digital learning integration, and the challenges related to infrastructure and pedagogical readiness. These findings can be interpreted through the perspective of language learning theory, technology adoption frameworks, and the socio-cultural relevance of local wisdom in education.

First, the results reveal that most students are already accustomed to using smartphones and tablets in their daily lives, primarily for entertainment purposes such as gaming, social media, and watching videos. This indicates a high level of digital exposure among young learners, which aligns with the concept of digital natives who are naturally more comfortable navigating digital environments compared to older generations (Sukma et al., 2022). From an educational perspective, this digital familiarity provides a strong foundation for introducing MAR-based storybooks.

The fact that children already use technology extensively outside the classroom suggests that integrating similar tools into learning can bridge the gap between their personal digital habits and formal educational practices (Jing et al., 2023). This also resonates with (Hsu, 2017b), who argues that AR-based learning experiences allow students to grasp language more effectively when aligned with their everyday use of technology. Thus, the necessity of adopting digital media in the classroom is evident, as it can transform existing habits into meaningful learning opportunities.

Second, the study confirms that students prefer story-based and interactive learning over traditional, text-heavy methods. Most of the students expressed a stronger interest in story-driven and visually rich media. This preference aligns

with the developmental characteristics of primary school learners, who are generally more engaged when learning is presented in narrative and playful formats (Pantaleo, 2023). In line with (Singh et al., 2020), young learners tend to show higher motivation and better comprehension when content is delivered through stories, games, and visuals rather than rote memorization.

Therefore, the integration of folktales into English storybooks, enriched with AR features, is not only pedagogically sound but also developmentally appropriate. The embedding of local folktales such as “The Origin of Pandeglang” or “The Tale of Ciomas” further enhances this approach, as students find stories rooted in their cultural background more relatable and meaningful. This directly supports (He & Li, 2023), who noted that contextually relevant materials increase children’s engagement and emotional connection to learning.

Third, teachers’ perceptions play a crucial role in the success of technology adoption. Both teachers in this study viewed the use of MAR positively, particularly when combined with culturally relevant content and critical thinking prompts. This is significant because teachers often act as learning instructor in the classroom, determining which resources are used and how effectively they are implemented. Positive teacher attitudes suggest that MAR storybooks have the potential to be accepted and integrated into classroom practice, provided that adequate training and support are offered (Han et al., 2023; Nuñez Enriquez & Oliver, 2021).

However, the findings also highlight that teachers face obstacles such as lack of training, limited resources, and unequal student access to devices. These constraints mirror broader challenges noted by (Akçayır & Akçayır, 2017), who emphasized that while AR offers significant pedagogical benefits, its implementation is often hindered by technical, logistical, and training issues. Therefore, while the necessity and desire for MAR storybooks are evident, addressing these lacks through systematic professional development and policy support remains crucial.

Another key issue identified is the students’ and teachers’ lack of exposure to interactive, contextualized English learning materials. This disconnect between students’ digital habits and classroom practices results in low motivation and engagement during lessons (Bembenuitty et al., 2023; Roumba & Nicolaidou, 2022). The use of MAR storybooks could address this gap by making language learning more interactive, immersive, and meaningful. For example, through AR animations, students can visualize story characters, listen to dialogues, and even participate in interactive activities that stimulate speaking and listening skills. Moreover, by including reflective and analytical questions within the stories, MAR storybooks can encourage students to think critically about the actions of characters, propose solutions, or evaluate moral lessons. This aligns with recent studies (Demircioglu et al., 2023; Faridi et al., 2021) showing that AR-based learning fosters higher-order thinking skills by engaging learners in evaluative and problem-solving tasks.

From the perspective of wants, students demonstrated strong enthusiasm for MAR features; stating that they preferred animated stories with sound and visual effects. Their motivation visibly increased when visuals, games, or interactive elements were included in the learning process. This shows that young learners are not only ready but also eager to embrace new technologies in education. Teachers also expressed a willingness to adopt MAR storybooks, provided they are aligned with the curriculum, easy to use, and accessible both online and offline. This dual support from students and teachers underscores the high feasibility of implementing MAR storybooks as long as technical and pedagogical barriers are minimized.

The incorporation of local wisdom into the MAR storybooks deserves special emphasis. By embedding folktales from Banten, the storybooks do not merely function as language learning tools but also as vehicles for cultural preservation and character education. Local wisdom-based stories carry moral, social, and cultural values that resonate with children's daily lives and strengthen their cultural identity (Sibarani, 2012; B. Singh, 2019). When presented in English through interactive AR media, these stories allow students to simultaneously acquire language skills and cultural pride. This dual benefit addresses not only linguistic competence but also the broader educational goals outlined in the Merdeka Curriculum, which emphasizes the Pancasila Student Profile, including cultural awareness, critical thinking, and creativity.

Finally, the pre-design phase of the MAR storybook demonstrates how technology, pedagogy, and cultural content can be effectively integrated (Liao et al., 2023). Features such as interactive AR markers, pronunciation tools, reflective questions, and vocabulary games represent a holistic approach that caters to both cognitive and affective aspects of learning. By ensuring accessibility through offline modes and lightweight applications, the design also responds to infrastructural challenges, thereby increasing its usability in diverse school settings.

The integration of AR storybooks as English language teaching materials in fourth grade primary school can be done by combining local folktales in the form of digital books enriched with augmented reality features, so that students not only read the text, but also see the story characters appear in animated form, listen to conversations, and interact through vocabulary games or reflective quizzes. In practice, teachers can use AR storybooks at the reading and listening stages, for example, when students scan images of characters or symbols with a tablet/smartphone, an animation appears that reads a simple dialogue in English. In this way, AR storybooks not only train language skills, but also increase learning motivation through visual-interactive experiences, while introducing local wisdom that is relevant to students' lives (Hsu, 2017b; Quraish et al., 2016).



This research, however, has several limitations that need to be considered. First, limited infrastructure and access to technology remain a major challenge, as not all schools or students have digital devices or adequate internet connections to support the optimal use of Mobile Augmented Reality (MAR) storybooks. Second, teacher readiness is also limited, particularly in terms of technical and pedagogical skills, to integrate AR technology into the English language learning process. Furthermore, the scope of respondents in this study was relatively small and only conducted in a specific region, so the results cannot be broadly generalized to the context of elementary schools in Indonesia. The MAR storybook product used is also still in the preliminary design stage, so its impact on improving English skills cannot be comprehensively evaluated, especially in the long term. Furthermore, this study focuses more on the needs, interests, and perceptions of students and teachers, so in-depth analysis of the improvement of language skills such as listening, speaking, reading, and writing is still limited.

In summary, the discussion highlights that the integration of MAR storybooks embedded with local wisdom addresses three major findings from the needs analysis: (1) students' familiarity and enthusiasm for digital media, (2) the lack of interactive and contextualized English learning resources, and (3) the strong desire from both students and teachers for innovative, culturally relevant, and motivating learning tools. While challenges such as infrastructure, access, and teacher readiness remain, the overall implications suggest that MAR storybooks have significant potential to transform primary English learning into a more engaging, meaningful, and future-oriented process.

## **Conclusion**

This study demonstrates that integrating Mobile Augmented Reality (MAR) into English storybooks offers an innovative response to the challenges faced in primary English learning. The needs analysis confirmed that students are highly familiar with digital devices, motivated by story-based and visual learning, and enthusiastic about interactive media. Teachers also expressed positive perceptions of MAR, particularly when combined with local wisdom folktales that provide cultural relevance and deeper engagement. The pre-design phase further emphasized how MAR storybooks can effectively merge technology, pedagogy, and cultural content to enhance vocabulary acquisition, listening and speaking skills, reading comprehension, and the development of critical thinking.

The findings also suggest important policy and pedagogical implications. Educational stakeholders, including schools and curriculum developers, are encouraged to adopt digital innovations such as MAR to support the goals of the Merdeka Curriculum and strengthen students' 21st-century competencies. Teacher professional development is essential to ensure that educators are prepared to integrate MAR-based materials into classroom practice effectively. At the policy level, greater support is needed for the development of culturally

grounded, accessible, and child-friendly digital learning resources, which can bridge the gap between students' digital habits and current classroom practices. By implementing these measures, English learning at the primary level can become more meaningful, engaging, and aligned with future educational needs.

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