

Development Of Augmented Reality E-Comic Based On Takengon Folklore To Improve Students Reading Ability

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ABSTRACT

The study purpose was to develop an Augmented Reality (AR) e-comic learning media based on the Takengon folklore “Batu Belah” to improve the reading ability of eighth-grade students at SMP N 4 Takengon. The development of innovative learning media is needed due to the limited variety of teaching media and the low interest of students in reading English texts. Integrating local folklore into digital learning media is expected to create a more engaging and meaningful reading experience for students.

Materials and methods. This study employed a Research and Development (R&D) method using the ADDIE model, which consists of Analysis, Design, Development, Implementation, and Evaluation stages. The product was validated by three experts: subject matter experts, media experts, and language experts. The effectiveness of the developed media was tested using a one-group pre-test and post-test design involving 25 eighth-grade students. Data were collected through expert validation sheets, reading tests, and student response questionnaires.

Results. The validation results indicated that the developed AR e-comic media was categorized as “Highly Suitable,” with average scores of 87.3% from subject matter experts, 98.6% from media experts, and 97.3% from language experts. The effectiveness test showed a significant improvement in students’ reading ability, with the average score increasing from 7.6 in the pre-test to 9.52 in the post-test. The paired sample t-test result showed that the t-value (9.632) was higher than the t-table (2.060) with a significance value of $0.000 < 0.05$.

Conclusions. It can be concluded that the AR e-comic based on Takengon folklore is effective in improving students’ reading ability and increasing their motivation in learning English. The integration of local cultural content with augmented reality technology provides an innovative and interactive learning experience for students.

Keywords: Augmented Reality, E-Comic, Takengon Folklore, Reading Ability, Learning Media

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INTRODUCTION

English has become a global language that plays an essential role in international communication, education, technology, and economic development. In the context of education, English proficiency is increasingly considered a fundamental competence that enables students to access global knowledge and participate in international academic and professional communities. Mastery of English allows learners to engage with diverse sources of information, expand their intellectual capacity, and develop critical thinking skills necessary for the twenty-first century (Crystal, 2019; Richards, 2020). Among the four core language skills listening, speaking, reading, and writing reading is often regarded as a foundational skill because it supports the development of other language abilities and facilitates knowledge acquisition. Through reading, students are able to interpret written information, construct meaning from texts, and develop analytical thinking skills that are crucial for academic success.

Reading ability plays a vital role in the development of literacy, which encompasses not only the ability to decode written words but also the capacity to understand, interpret, evaluate, and apply information obtained from texts. Literacy competence enables learners to navigate the increasingly complex information environment of the modern world. In English language learning contexts, reading comprehension becomes particularly important because it helps students acquire vocabulary, recognize grammatical structures, and develop language awareness (Grabe & Stoller,

2020). Therefore, improving students' reading ability remains a central objective in English language education.

Despite its importance, many students still encounter difficulties in developing adequate reading skills, particularly in English as a foreign language (EFL) contexts such as Indonesia. Various international assessments have revealed that the reading literacy level of Indonesian students remains relatively low compared to global standards. The Programme for International Student Assessment (PISA) report indicates that Indonesian students' reading performance consistently falls below the average score of OECD member countries (OECD, 2023). This condition suggests that many students struggle with understanding written texts, identifying main ideas, interpreting contextual meanings, and making inferences from reading materials. Furthermore, students often experience challenges related to limited vocabulary, lack of reading strategies, and insufficient exposure to engaging reading materials.

In addition to linguistic difficulties, students' low motivation to read English texts also contributes significantly to the problem. Traditional teaching methods that rely heavily on textbooks and teacher-centered instruction often fail to stimulate students' interest in reading activities. When learning materials are perceived as monotonous or difficult to understand, students tend to lose motivation and engagement in the learning process. Consequently, educators are encouraged to explore innovative teaching approaches and interactive learning media that can attract students' attention and facilitate meaningful learning experiences (Tomlinson, 2021).

One potential solution to address these challenges is the integration of digital technology into language learning. The rapid development of educational technology has created new opportunities to design engaging and interactive learning environments. Digital learning media can provide visual, auditory, and interactive elements that enhance students' comprehension and motivation. Among various digital learning tools, comics have gained increasing attention as effective media for language learning. Comics combine textual narratives with visual illustrations, allowing students to understand stories more easily while simultaneously developing vocabulary and reading comprehension (Yang, 2018). The visual context provided by comics helps learners interpret unfamiliar words and understand the storyline, making reading activities more enjoyable and less intimidating.

Recent studies have demonstrated that digital comics can significantly improve students' reading ability and language engagement. Flores-González et al. (2024) found that the use of digital comics in language learning environments enhances vocabulary acquisition, creativity, and reading comprehension. The combination of images, dialogues, and narrative structures encourages students to actively interact with the text, thereby improving their overall literacy skills. Furthermore, digital comics can support multimodal learning by integrating visual and textual information, which helps students process language more effectively.

In recent years, the integration of Augmented Reality (AR) technology has further expanded the potential of digital learning media. Augmented Reality refers to a technology that overlays digital information such as images, animations, or three-dimensional objects onto the real-world environment through digital devices. In educational contexts, AR has been widely used to create immersive learning experiences that enhance student engagement and understanding (Azuma, 2020). By integrating AR with digital comics, educators can transform traditional reading materials into interactive learning experiences where students can explore animated characters, visual effects, and interactive storytelling elements.

Research has shown that AR-based learning media can significantly enhance students' motivation and learning outcomes. Pahlevi et al. (2024) reported that students who used AR-based storybooks demonstrated a substantial improvement in English language skills compared to those who used conventional learning methods. The interactive nature of AR encourages students to actively participate in the learning process and stimulates curiosity, which ultimately contributes to improved comprehension and retention of information. Similarly, Maulyda et al. (2024) emphasize that AR technology has the potential to transform traditional classroom practices by promoting innovation, engagement, and experiential learning.

Besides technological innovation, incorporating local cultural elements into learning materials can also enhance students' learning experiences. Local culture serves as an important resource in education because it provides meaningful contexts that are familiar to students' daily lives. Folklore, in particular, represents a valuable cultural heritage that contains moral values, social norms, and traditional wisdom passed down through generations. Integrating folklore into language learning not only enriches students' understanding of cultural identity but also promotes contextualized learning (Yumnam, 2021). When students read stories that are closely related to their cultural background, they are more likely to feel connected to the content, which increases their interest and motivation to learn.

Folklore-based learning also provides opportunities to integrate moral education into language learning. Traditional stories often contain lessons about honesty, responsibility, respect, and social harmony. By engaging with such narratives, students can develop both linguistic competence and character education simultaneously. Several studies have shown that folklore-based learning approaches can enhance students' language skills, including speaking, reading, and writing, while also fostering appreciation for local culture (Daeli et al., 2025). Therefore, incorporating folklore into English learning materials represents a meaningful strategy to combine language development with cultural preservation.

In the context of Central Aceh, Takengon folklore represents an important cultural resource that can be integrated into educational media. One well-known folktale from this region is the story of Batu Belah, which reflects moral values and local cultural traditions. However, despite its cultural significance, this folklore has rarely been integrated into modern digital learning media. Most English learning materials used in schools still rely on generic or foreign contexts that may not fully resonate with students' cultural experiences. Consequently, students may find it difficult to connect with the content of the reading materials.

Integrating Takengon folklore into digital learning media such as AR-based e-comics offers a promising approach to address this issue. By presenting local stories through interactive and visually engaging formats, students can simultaneously improve their English reading skills while learning about their cultural heritage. The combination of AR technology, digital comics, and folklore narratives can create a learning environment that is both educational and entertaining, thereby increasing students' motivation to read.

Although several studies have examined the effectiveness of digital comics and AR technology in language learning, limited research has focused on the development of AR-based e-comic learning media that incorporate local folklore, particularly for junior high school students in Indonesia. Previous studies have primarily explored digital comics for vocabulary learning or reading comprehension in general contexts without integrating local cultural narratives. Therefore, there is still a research gap regarding the development and evaluation of AR-based e-comic media that combines technology, storytelling, and cultural content in English language learning.

Based on this research gap, the present study aims to develop an Augmented Reality e-comic based on Takengon folklore and evaluate its effectiveness in improving students' reading ability. The study focuses on eighth-grade students at SMP N 4 Takengon and examines both the validity of the developed learning media and its impact on students' reading performance. By integrating innovative technology with culturally relevant content, this research is expected to contribute to the development of creative and contextualized English learning media that can enhance students' literacy skills and motivation.

METHOD

This study employed a Research and Development (R&D) method to develop an Augmented Reality (AR) e-comic based on Takengon folklore as a learning medium to improve students' reading ability. Research and Development is a systematic process used to design, develop, and evaluate educational products in order to ensure their effectiveness and feasibility for instructional purposes (Sugiyono, 2016). The development process in this study followed the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model is widely used in educational media development because it

provides a structured and flexible framework that allows continuous improvement throughout the development process (Maisyarah & Sufa, 2026). The participants of this study were eighth-grade students at SMP Negeri 4 Takengon, located in Central Aceh, Indonesia. The population consisted of five classes with a total of 185 students. One class consisting of 25 students was selected as the research sample using purposive sampling. This technique was applied based on several considerations, including the readiness of the class to participate in the research, the accessibility of the class for implementing the learning media, and the support of the English teacher during the research process (Gay, Mills, & Airasian, 2012). The research object was the Augmented Reality e-comic developed based on Takengon folklore, which integrates local cultural narratives with interactive digital features to support students' reading comprehension and vocabulary development.

Several research instruments were used to collect the data. First, observation sheets were used to identify the initial learning conditions and students' responses during the implementation of the learning media. Second, a teacher needs analysis questionnaire was distributed to identify the necessity and relevance of developing AR-based learning media in English learning. Third, expert validation sheets were used to evaluate the feasibility of the developed product. The validation process involved subject matter experts, media experts, and language experts who assessed aspects such as content accuracy, visual design, language appropriateness, and instructional suitability. Fourth, student and teacher response questionnaires were used to measure the practicality, attractiveness, and usability of the developed media. Finally, pre-test and post-test instruments were administered to measure students' reading ability before and after using the AR e-comic learning media. Data collection was conducted through several stages. Initially, observations and needs analysis were conducted to identify problems in English learning and determine the need for innovative learning media. After the development of the AR e-comic, expert validation was carried out to ensure the product met educational and technical standards. The validated product was then implemented in the classroom through a learning experiment using a one-group pre-test and post-test design.

Data analysis was conducted using both descriptive and inferential statistical techniques. The validity of the product was analyzed using percentage calculations based on expert validation results. Student and teacher responses were also analyzed using descriptive statistics. Meanwhile, the effectiveness of the AR e-comic in improving students' reading ability was measured by comparing the pre-test and post-test scores using a paired sample t-test with the help of Statistical Package for the Social Sciences (SPSS). The hypothesis testing used a significance level of 0.05 to determine whether there was a significant improvement in students' reading ability after using the developed learning media.

FINDING AND DISCUSSION

Needs Analysis

The needs analysis was conducted at SMP Negeri 4 Takengon, located in Bale Village, Lut Tawar District, Central Aceh Regency. Preliminary observations revealed that the learning media used in English classes were still limited to textbooks and conventional teaching materials. Teachers rarely used interactive or technology-based media to support reading instruction. As a result, students tended to be less enthusiastic during reading lessons and showed low engagement with narrative texts, particularly folklore.

Observation results showed that students often appeared bored and passive during reading activities. They mainly listened to the teacher's explanation without active participation in discussions or asking questions. Furthermore, students had difficulty understanding folklore texts because the material was presented only in written form without visual support.

To strengthen the observation results, a questionnaire was distributed to the English teacher to identify the need for innovative learning media. The results indicated that the teacher agreed that students often experienced boredom during reading lessons and had difficulty understanding narrative texts. The teacher also confirmed that learning media currently used in the classroom did not utilize Augmented Reality (AR) technology or other digital interactive tools.

These findings indicate that students require more engaging learning media that combine visual elements, storytelling, and technology. Therefore, the development of AR-based e-comic media using local folklore was considered appropriate to address this learning problem. Visual storytelling in digital comics can help students better understand narrative texts while maintaining their interest in reading.

The integration of local folklore in learning media also plays an important role in making the learning content more contextual and meaningful. By presenting the Takengon folklore story “Atu Belah,” students can connect the learning material with their cultural background, which may enhance their motivation and comprehension.

Development of AR E-Comic Media

The development of AR E-comic media followed the ADDIE model proposed by Branch, which includes five stages: analysis, design, development, implementation, and evaluation. This systematic model allows researchers to design learning media that are aligned with students’ needs and instructional objectives.

Design Stage

During the design stage, the researcher created the storyline based on the Takengon folklore “Atu Belah.” The accuracy of the folklore narrative was ensured by interviewing a Gayo cultural figure who has deep knowledge of the history and traditions of the region. The story was then rewritten into a simplified narrative text suitable for junior high school students. After the storyline was prepared, comic dialogues were designed to represent the narrative in a more interactive format. The dialogues were written using simple English sentences to ensure readability and comprehension for eighth-grade students.

Development Stage

The development stage involved transforming the designed storyline and dialogues into a digital comic format. Several digital platforms were used in this process, including Canva for storyboard creation, Pixton for character design, Pinterest for visual references, and Assemblr Edu for integrating Augmented Reality features.

The comic panels were designed with colorful illustrations and expressive characters to attract students’ attention. Each comic page also included new vocabulary to help students expand their English word knowledge while reading the story. The integration of AR technology allowed students to scan specific images in the comic and view animated objects or scenes through their mobile devices. This combination of visual storytelling, vocabulary enrichment, and AR interaction aimed to create an engaging learning experience that could improve students’ reading comprehension.

Expert Validation Results

Before implementing the AR E-comic media in the classroom, the product was evaluated by experts to ensure its feasibility. The validation process involved three types of experts: material experts, media experts, and language experts.

Material Expert Validation

Material experts evaluated the content of the AR E-comic, including the relevance of learning objectives, the completeness of materials, and the suitability of the narrative text for students’ needs.

Table 1. Material Expert Validation Results

Indicator	Score
Suitability of learning objectives	15
Suitability to students’ needs	13
Alignment with curriculum	10
Completeness of material	15
Visual support for understanding	14
Language appropriateness	15
Sentence clarity	14

Indicator	Score
Interesting presentation	13
Systematic organization	12
Total Score	131
Percentage	87.3%

The validation results show that the AR E-comic media achieved a feasibility percentage of 87.3%, which falls into the “highly suitable” category. This indicates that the learning content is appropriate for use in English reading instruction.

Media Expert Validation

Media experts evaluated the visual design, navigation, usability, and technical performance of the AR features.

Table 2. Media Expert Validation Results

Indicator	Score
Attractive appearance	15
Layout and animation proportion	15
Navigation ease	15
Text readability	13
AR functionality	15
Non-distracting visuals	15
Accessibility	15
Ease of use	15
Color and illustration attractiveness	15
Interactive learning experience	15
Total Score	148
Percentage	98.6%

The validation result indicates that the AR E-comic media obtained 98.6%, categorized as very feasible for classroom use.

Language Expert Validation

Language experts evaluated grammar accuracy, vocabulary appropriateness, and the clarity of narrative sentences.

Table 3. Language Expert Validation Results

Indicator	Score
Language appropriateness	15
Grammar accuracy	14
Vocabulary suitability	14
Clarity of meaning	14
Consistency of terminology	14
Correct spelling	15
Engaging narrative style	15
Cultural appropriateness	15
Literacy support	15
Politeness and values	15
Total Score	146
Percentage	97.3%

These results demonstrate that the linguistic aspects of the AR E-comic are also categorized as highly suitable, ensuring that the language used is appropriate for junior high school students.

Effectiveness of AR E-Comic on Students' Reading Ability

To measure the effectiveness of the developed media, a pre-test and post-test were conducted with 25 eighth-grade students.

Table 4. Pre-test and Post-test Scores

Test	Total Score	Mean Score
Pre-test	190	7.60
Post-test	238	9.52

The mean score increased from 7.60 in the pre-test to 9.52 in the post-test, indicating a significant improvement in students' reading ability after using the AR E-comic.

To further analyze the difference, a paired sample t-test was conducted.

Table 5. Paired Sample T-Test Results

Test	t-value	t-table	Sig. (2-tailed)
Pre-test – Post-test	9.632	2.060	0.000

Since the t-test value (9.632) is greater than the t-table value (2.060) and the significance value is $0.000 < 0.05$, it can be concluded that there is a significant difference between the pre-test and post-test scores. This result indicates that the use of AR E-comic media significantly improves students' reading ability.

Students' Responses to AR E-Comic Media

Students' responses were also analyzed to measure their level of engagement and satisfaction with the learning media.

Table 6. Students' Achievement Level

Percentage Interval	Frequency	Percentage
90%–100%	18	72%
80%–89%	5	20%
70%–79%	2	8%
<70%	0	0%

The results show that 72% of students achieved scores in the “very high” category, indicating that most students responded positively to the use of AR E-comic media.

The overall average achievement percentage was 92.32%, which reflects a very strong level of effectiveness. Students reported that the visual illustrations, comic dialogues, and AR features helped them understand the story more easily and made the learning process more enjoyable.

Discussion

The findings of this study demonstrate that the development of AR-based E-comic learning media using Takengon folklore significantly improves students' reading ability. The improvement can be observed through the increase in the average score from 7.60 in the pre-test to 9.52 in the post-test, as well as the statistical results of the paired sample t-test.

These findings support previous studies which state that digital comics can enhance students' language learning outcomes. Visual storytelling helps learners understand narrative texts more effectively because images and dialogues provide contextual clues that support comprehension. Digital comics also encourage students to read more actively because the format is more engaging than traditional textbooks.

Furthermore, the integration of Augmented Reality technology provides an immersive learning experience that increases student motivation. AR allows students to interact with digital objects and animations, making the reading process more dynamic and interesting. This interactive experience helps students maintain focus during learning activities and encourages deeper engagement with the text.

Another important aspect of this study is the integration of local folklore into learning media. The use of culturally relevant stories helps students connect the learning material with their own cultural background. This contextualization can improve students' interest in reading because they are already familiar with the cultural setting of the story. The positive responses from students further confirm the effectiveness of the AR E-comic media. Most students reported that the media

made reading activities more enjoyable and easier to understand. The inclusion of vocabulary lists also helped students learn new English words while reading the story.

Despite these positive outcomes, several challenges were identified during the implementation stage. One of the main challenges is the need for teachers to develop sufficient digital literacy skills to effectively integrate AR technology into classroom learning. Without adequate training and preparation, teachers may find it difficult to utilize technology-based media optimally. Therefore, future research should explore strategies to improve teachers' readiness in using AR-based learning media. Training programs and workshops may help educators gain the necessary skills to integrate digital technology into their teaching practices.

In addition, future studies could also examine the long-term impact of AR-based learning media on students' language proficiency. While this study focuses on reading ability, similar approaches could be applied to other language skills such as writing, speaking, and vocabulary acquisition.

Overall, this study demonstrates that the combination of digital comics, Augmented Reality technology, and local cultural content provides an effective approach to improving students' reading ability. The AR E-comic media developed in this research offers an innovative and engaging learning tool that can enhance English language learning for junior high school students.

CONCLUSIONS

Research on the development of AR e-comic media based on the Takengon folklore "Batu Belah" through the ADDIE procedure (analysis, design, development, implementation, evaluation) based on the theory continued by Branch (2009) has succeeded in creating learning media that is declared "very feasible" based on the results of validation by subject matter experts (87.3%), media experts (98.6%), and language experts (97.3%). The implementation of this media proved to be significantly effective in improving the reading skills of eighth-grade students at SMP N 4 Takengon, as shown by an increase in the average score from 7.6 on the pre-test to 9.52 on the post-test, and supported by the results of a paired sample t-test with a t-value (9.632) greater than the t-table (2.060) at a significance level of $0.000 < 0.05$. In addition, student responses reached an average percentage of 92.32% in the "Very High" category, confirming that the integration of Augmented Reality technology and local wisdom not only facilitates the understanding of narrative texts but also increases student motivation and active involvement in the English learning process..

REFERENCES

- Arikunto, S. (2013). *Prosedur Penelitian: Suatu Pendekatan Praktik*. Rineka Cipta.
- Azuma, R. (2020). A survey of augmented reality. *Presence: Teleoperators and Virtual Environments*, 29(4), 355–385.
- Creswell, J. W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). Sage Publications.
- Crystal, D. (2019). *The Cambridge Encyclopedia of the English Language* (3rd ed.). Cambridge University Press.
- Daeli, D., Harefa, A., & Telaumbanua, T. (2025). Folklore-based learning to improve students' speaking skills and cultural awareness. *Journal of Language and Education*, 11(1), 45–57.
- Flores-González, N., Ramírez-Montoya, M., & García-Peñalvo, F. (2024). Digital comics as tools for language learning: Enhancing lexical competence and creativity. *Education and Information Technologies*, 29(3), 2457–2473.
- Gay, L. R., Mills, G. E., & Airasian, P. (2012). *Educational Research: Competencies for Analysis and Applications* (10th ed.). Pearson.
- Grabe, W., & Stoller, F. (2020). *Teaching and Researching Reading* (3rd ed.). Routledge.
- Maisyarah, Siti & Sufa, Rahmat Asri. (2026). *Riset Ilmiah Modern : Teori dan Praktik Metodologi Penelitian*. Banjar : Ruang Karya Bersama.
- Maulnya, M., Hidayati, N., & Rahman, A. (2024). Teachers' readiness in implementing augmented reality in educational environments. *International Journal of Emerging Technologies in Learning*, 19(2), 95–109.

- Molenda, M. (2003). In search of the elusive ADDIE model. *Performance Improvement*, 42(5), 34–37.
- OECD. (2023). *PISA 2022 Results: The State of Learning and Equity in Education*. OECD Publishing.
- Pahlevi, M., Suryani, N., & Setiawan, D. (2024). The effectiveness of augmented reality storybooks in improving English learning outcomes. *Journal of Educational Technology Development*, 12(1), 21–33.
- Richards, J. C. (2020). *Key Issues in Language Teaching*. Cambridge University Press.
- Sugiyono. (2016). *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. Alfabeta.
- Tomlinson, B. (2021). *Materials Development for Language Learning and Teaching*. Cambridge University Press.
- Yang, G. (2018). *Graphic Novels in the Classroom*. University Press of Mississippi.
- Yumnam, R. (2021). Folklore in language education: Integrating cultural narratives into classroom learning. *International Journal of Language Studies*, 15(2), 55–70.