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Enhancing Students' Reading Interest by Developing Augmented Reality-Based Storybooks

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A B S T R A C T

This study aims to increase students' interest in reading by developing augmented reality (AR)-based storybooks. This study is a development study using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) development model. The difference between this storybook and others is that it uses Augmented Reality technology, and students create their own stories based on readings that interest them, as well as design the story images using the Canva application. This research was conducted on second-semester students majoring in Information Systems at Pasir Pengaraian University. The development instruments used were media expert validation sheets, material expert validation sheets, and user response questionnaires. The results of the first validator's validation were a score of 50, with a percentage of 80% in the "Suitable" category from 12 statements. Meanwhile, the second validator obtained a score of 49, with a percentage of 81% in the "Very Suitable" category from 7 statements. Furthermore, from the user response questionnaire, a score of 97% was obtained, with a category of "Very Suitable" from 11 statements, involving 10 students as users. Based on these results, it can be concluded that the augmented reality (AR)-based picture storybook media is declared very suitable for use as a literacy learning medium.

1. Introduction

The development of digital technology in the era of the 4.0 industrial revolution has brought significant changes in various aspects of life, one of which is in the field of information and communication technology. According to (Zai & Zai, 2025), students' interest in reading has declined due to competition with more attractive visual content, such as social media and short videos. In fact, good literacy skills are very important to support learning and intellectual development (Oktaviana et al., 2024). In line with this, (Robin, 2008) said that conventional textbooks are often considered boring and less interactive, so they are unable to attract the interest of a generation that is accustomed to technology. Based on data from the National

Library of Indonesia and PISA (OECD, 2019), this phenomenon is evident from the low reading interest among students, both globally and locally. Meanwhile, the main objective of reading instruction is to improve students' ability to understand language texts with greater efficiency and accuracy (Jannah, 2025).

Reading involves not only understanding ideas but also recognizing the relationships and structures between ideas. This means that when reading, readers do not just read the text but must also understand its meaning (Jannah, 2022). Meanwhile, at the university level, reading comprehension is certainly an important component for everyone, both lecturers and students (Jannah, 2021). According to (Aldi Albani, 2021) Indonesia, students' interest in reading in Indonesia is still relatively low, as shown by UNESCO data that only 1 in 1,000 Indonesians have an active reading habit. This situation is concerning, considering that reading is a fundamental skill that supports academic success and personal development. Several factors contribute to low reading interest, including the dominance of digital media, which is more visually appealing, a lack of innovation in the presentation of reading materials, and limited access to reading materials that are interesting to students.

One innovation that is growing rapidly is Augmented Reality (AR). This technology combines the real world with virtual elements in the form of text, images, audio, and three-dimensional objects in real time, providing users with a more realistic interactive experience. According to (Pueng et al., 2020), Augmented Reality is a technology that combines computer-generated objects, two-dimensional or three-dimensional, into the real environment around the user in real time. The objects displayed by Augmented Reality help users generate new understandings or images that enable them to interact with the real environment. Augmented Reality aims to combine the real world with virtual technology by adding contextual data so that users can easily understand clearly.

Through this integration, digital objects can be projected directly into real space so that users experience more realistic interactions. With these characteristics, AR makes the boundary between the real world and the virtual world increasingly thin, even almost invisible, because both can complement each other in a single experience (Salvetti et al., 2023). Augmented Reality was first introduced in the 1990s, but its development has accelerated with the increasing capabilities of hardware such as smartphones, tablets, and smart glasses. This technology is now widely used in various fields, ranging from entertainment, education, health, military, to the business sector. For example, in the field of education, Augmented Reality (AR) is used to visualize abstract learning materials in a more concrete and understandable way (Chairuna et al., 2023). According to (Taneja & Dutta, 2024), advances in mobile devices have made AR more accessible, economical, and efficient than ever before. Modern mobile devices with cameras, fast processors, and internet connectivity allow students and teachers to use AR applications without the need for expensive specialized equipment. Meanwhile, in the business world, AR is used for product promotion through more attractive 3D visualizations. The main benefit of Augmented Reality (AR) lies in its ability to create immersive, interactive, and contextual experiences. With AR, users not only view information

statically, but can also interact directly with the digital content displayed. This not only increases user engagement, but also the effectiveness of information delivery. Additionally, interactivity in AR can be achieved through the use of various specific input devices that allow users to interact directly with these virtual elements (Abdulghani & Sati, 2020).

Researchers designed learning with an approach of developing Augmented Reality-based storybooks as an effort to increase students' interest in reading. In addition to utilizing Augmented Reality (AR) technology, which is capable of displaying visual and interactive elements, this study also utilizes Canva as a digital design platform that is easily accessible to students. Canva is used by students to design digital storybooks that are then integrated with AR, resulting in attractive and interactive literacy products where Canva is used for design and AR is used to present animations. The urgency of this research lies in the need for innovation in learning methods that can adapt to the preferences and learning styles of the current generation. The objectives of this research are to develop an Augmented Reality (AR)-based storybook to enhance students' reading interest, to validate the appropriateness of the AR-based storybook through expert evaluations, and to assess users' responses to this literacy learning medium.

2. Methodology

Sub-chapter (if any)

This type of research is a research and development method because it creates a product. The research and development method is a method used to produce a specific product and test its effectiveness (Hulfa et al., 2023). To produce a specific product, needs analysis research is used, and to test the effectiveness of the product so that it can function in the wider community, this research requires an experimental method to test its effectiveness. According to (Putri Weldami & Yogica, 2023), the products referred to are products such as teaching materials such as textbooks, learning media, modules, student worksheets, and others, which can also be in the form of learning methods, applications, and so on. This research model uses the ADDIE model designed by Robert Maribe Branch. The ADDIE model has five stages, namely: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation. The data collection techniques used by the researcher in this study were: 1) observation, 2) interviews, and 3) questionnaires. The instruments used in this study were (1) subject matter expert instruments, (2) media expert instruments, and (3) user instruments.

3. Results and Discussion

Analysis Stage (Results of needs analysis)

Needs analysis was conducted to determine an initial overview in order to obtain more accurate information through interviews with lecturers and students. The

results of the interviews showed that teachers said that there were still very few literacy media available in grade 2 classrooms and that there were no technology-based storybooks.

Analysis of products/teaching materials

1. Identity *and Branding*
   a. The university logo at the top indicates that this product is the result of academic research/development
   b. The title is clearly placed in the center in a large font so that it is immediately readable by users.

2. *Main Menu Structure*
   This product/teaching material is in the form of an interactive application that supports picture storybooks with Augmented Reality (AR) technology. The available menus consist of:
   a. Learning Objectives → contains the competencies or achievements expected of students after using the media
   b. Instructions for Use → provides guidance so that students can easily operate the AR application
   c. Material → contains the contents of picture storybooks that support literacy learning
   d. D AR Images → the main feature that displays AR-based 3D objects, making the story more vivid and interactive
   e. Exercises → provides learning evaluation through practice questions.
   f. About the Application → contains information about the developer, the purpose of creation, and a brief description of the application
   g. Exit Application → a button to close the application (colored red so that it is easy to see).

3. *Design and Appearance*
   a. The background uses traditional motifs, giving it a local feel and reinforcing the cultural context
   b. The menu buttons are designed in 3D with gradient blue colors, which are quite eye-catching and easy to distinguish
   c. The use of red for the Exit Application menu helps distinguish the main function from the closing function.

4. *Pedagogical Aspects*
   a. Learning objectives, materials, and exercises are available that emphasize cognitive, affective, and skill aspects
   b. AR-based media adds visual and kinesthetic aspects that are suitable for elementary school students
   c. The combination of picture stories + AR + exercises → supports reading literacy while training comprehension.

5. *Advantages*
   a. Innovative because it combines storybooks with AR technology.

b. Simple and clear menu display, making it easy for students to navigate.

Design stage

The system design in this study is a continuation of the previous system analysis stage, which is part of the system development cycle. This analysis is based on functional requirements and preparations for designing and implementing the system, which explains how the system will be formed. The design includes drawing, designing, and sketching or arranging separate elements into a complete and functional whole. In addition, the design also includes the configuration of hardware and software components.

1. *System Overview*

The overview of the system designed in this study involves one user, namely students, to study augmented reality-based storybooks. The software architecture overview of the augmented reality-based storybook application is described in Table 1 below:

Table 1. Software Architecture

User	Task	Rights
User	Using the Application	Users can use every available application menu to learn and understand from Augmented Reality-based storybooks.

2. *Use Case Proposed*

This system consists of one actor, namely the user, who is a student. The user can perform several activities, including viewing learning objectives, reading usage instructions, exploring 3D AR images, completing practice questions, and accessing information about the application.

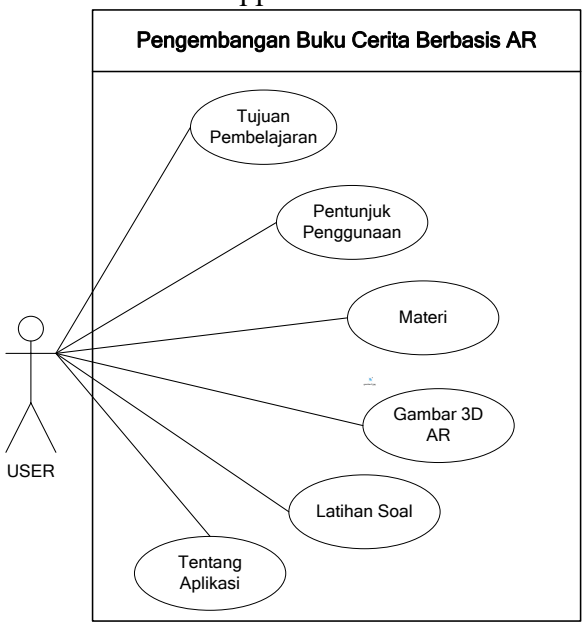

Figure 1. Use Case Ch Development of AR-Based Storybooks

Development stage

The content of this book tells the stories of students' experiences, so students are allowed to write stories based on their own imagination. The next stage is to create or compile narratives, with the first step being the creation of image designs. The following are the details of the book being developed:

1. Opening Page

At the top, the Pasir Pengaraian University logo is displayed to represent the developer of the application, followed by the clear and prominent title of the application that introduces users to its main purpose — providing innovative learning media based on picture stories using Augmented Reality (AR) technology.

In the middle of the screen, there are several interactive menu buttons with blue 3D designs, as well as a red button to exit the application. Each button has a different function:

Figure 2. Home Page

2. Learning Objectives Page

The Learning Objectives page displays an explanation of the competencies that students will achieve through using this application.

Figure 3. Learning Objectives Page

3. User Guide Page

The User Guide Page will display practical guidelines so that users can easily understand how to operate the application.

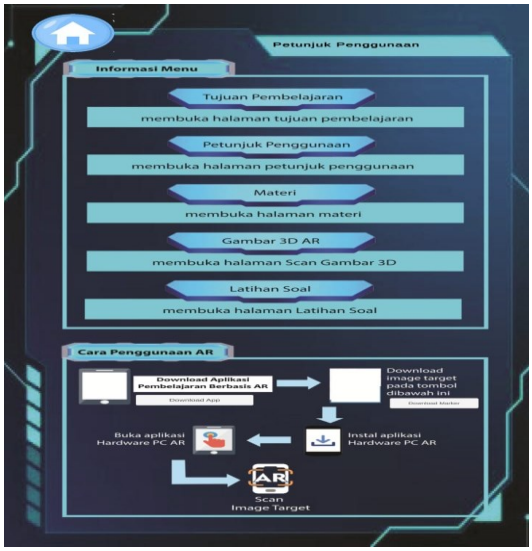

Figure 4. Learning Objectives Page

4. Materials Page

The Material Page contains core content in the form of picture stories designed according to learning needs.

Figure 4. Material Destination Page

5. 3D AR Page

The 3D AR Image Page will display three-dimensional objects based on Augmented Reality that appear when directed at certain markers.

Figure 5. Material Destination Page

6. Exercise Page

The Practice Questions Page will display and provide evaluation questions to measure students' understanding of the material studied.

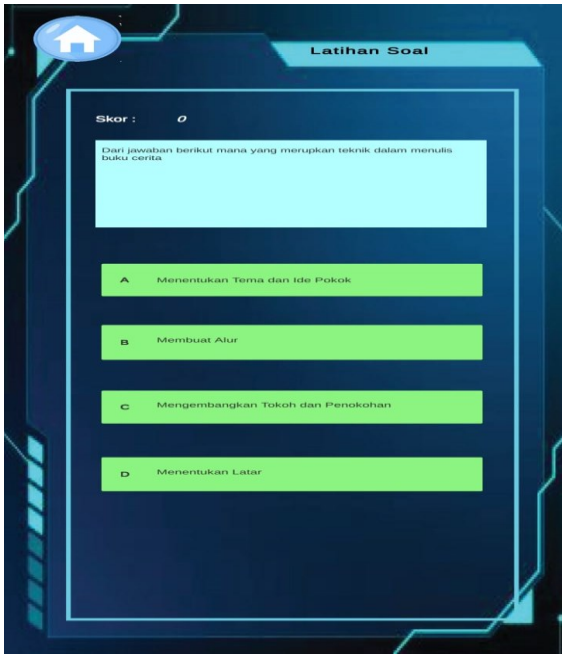

Figure 6. Practice Questions Page

7. About the Application Page

The About the Application page displays brief information about the background, development objectives, and developer profile of the application.

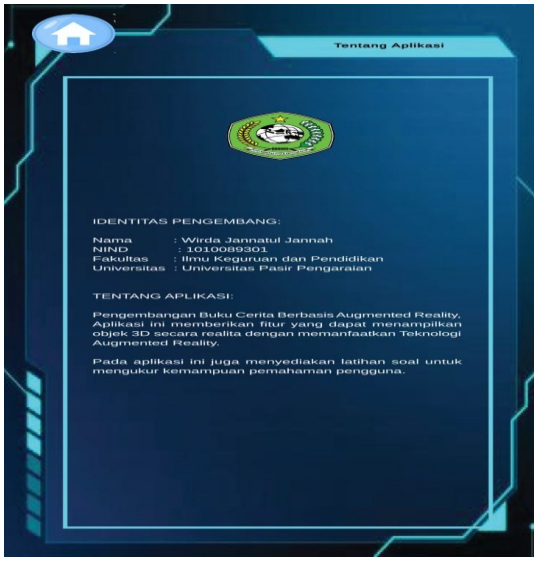

Figure 7. About the Application Page

Implementation Stage

After being declared feasible by the validator, the picture storybook media can undergo field testing. This stage was carried out by 10 of the 45 second-semester Information Systems students at Pasir Pengaraian University in the 2025/2026

academic year. The implementation of the picture storybook media was carried out in class during Indonesian language lessons. In the initial stage, an introduction to the augmented reality picture storybook media was provided, showing examples and explaining the Canva application. It was explained that the stories were designed by the students themselves, and then the students created their own designs.

Evaluation Stage

The evaluation stage of the illustrated storybook media. At this stage, the assessment was based on the feasibility of the media and its effectiveness in improving student literacy. The feasibility and effectiveness of the media were assessed through questionnaires completed by media experts, subject matter experts, and student response questionnaires.

Product Trial Results
Expert Validation Results

The picture storybook produced in the next stage of development was validated by two validators, namely Mr. Imam Rangga Bakti, M. Kom as the media/display expert validator and Mrs. Rina Ari Rohmah as the material expert validator. The validation provided by the validators was an assessment of the augmented reality picture book in terms of appearance, content, language, and design. In addition to assessing, the validators also provided criticism or suggestions that were used to revise the picture book.

The augmented reality picture storybook was validated by media/display expert Mr. Imam Rangga Bakti, M. Kom, who assessed its design, appearance, and font use. The evaluation covered aspects such as font size and type, AR code placement and functionality, visual appeal, image and text clarity, story coverage, and paper quality. The validation resulted in a total score of 50 out of 60, equivalent to 83.3% (rounded to 80%), which falls into the "Eligible" category (61–80%). This indicates that the storybook is suitable for use as a literacy learning medium in terms of appearance and media quality. Additional information can be seen in Table 2.

Table 2. Percentage of Media Expert/Appearance Suitability

Aspect	Statement	Yes	No
Media application and media display	Media application and media display	4	
	Text size and font type are appropriate and easy to read	4	
	The location of the AR code in the storybook is correct	4	
	The AR code on the media is functioning properly	5	
	The display and colors on the media are clearly attractive	5	
	The display of images and story content on the media is appropriate	4	
	The clarity of the text on the media is very clear	4	
	The scope of the story and display is appropriate	4	
	The paper used is thick and of good quality	4	

Media Font	The size of the images in the storybook is appropriate for the size of the storybook	4
	The font size in the storybook is appropriate and easy to read	4
	The use of color in the font is clear, making it easy to read	4
Total		**50**
Total Score		**50**
Number of items		**12**
Maximum total score		**60**
Percentage		**83,3% (rounded to 80%)**

The second validator, Mrs. Rina Ari Rohmah, evaluated the learning and content aspects of the augmented reality picture storybook. Her assessment focused on the alignment between the storybook's content, pedagogical principles, and literacy materials. Key components evaluated included the appropriateness of the storyline, its integration with images, readability, language clarity, attractiveness of design and content, and overall suitability for students' reading levels. The validation results, as shown in Table 3, indicate a total score of 49 out of 60, or 81%, which falls within the "Very Feasible" category (81–100%). This demonstrates that the storybook is highly suitable for use as a literacy learning medium in terms of learning content and material quality.

Table 3. Percentage of Material Expert Eligibility

Aspect	Statement	Yes	No
Media application and media display	Media application and media display	4	
	Text size and font type are appropriate and easy to read	4	
	The location of the AR code in the storybook is correct	4	
	The AR code on the media is functioning properly	4	
	The display and colors on the media are clearly attractive	4	
	The display of images and story content on the media is appropriate	4	
	The clarity of the text on the media is very clear	4	
	The scope of the story and display is appropriate	4	
	The paper used is thick and of good quality	4	
Media Font	The size of the images in the storybook is appropriate for the size of the storybook	4	
	The font size in the storybook is appropriate and easy to read	5	
	The use of color in the font is clear, making it easy to read	4	
Total		**49**	
Total Score		**50**	
Number of items		**12**	
Maximum total score		**60**	
Percentage		**81%**	

After validation by both experts, the augmented reality picture storybook was tested on students to gather user feedback and evaluate its effectiveness as a learning medium. The test involved 10 students who completed a user response questionnaire containing 11 statements about ease of use, visual appeal, content

suitability, and learning effectiveness. As shown in Table 4, the total score obtained was 534 out of 550, equivalent to 97%, which falls within the "Very Feasible" category (81–100%). This high percentage indicates that students found the augmented reality picture storybook very engaging, easy to use, and effective as a literacy learning medium.

Table 4. User Response Questionnaire Results

Statement	Yes	No
The media usage guide is clear and easy to understand	49	
The story content is clear and easy to understand	49	
The colors used are appropriate for the images and attractive	48	
The animated images in the story are very interesting	49	
The appearance of the storybook media is very attractive	49	
The story is interesting to read	49	
The content matches the storybook title	49	
The language used is clear and easy to understand	49	
Students easily understand the story content	47	
The images presented are very attractive	48	
The font size and type used are very clear	38	
Total	**534**	
Total Score		**534**
Number of items		**11**
Total maximum score		**550**
Percentage		**97%**

To interpret the validation and user response results, the feasibility achievement category was used as a reference. This category consists of five levels: 0–20% (Very Unfeasible), 21–40% (Unfeasible), 41–60% (Fairly Feasible), 61–80% (Suitable), and 81–100% (Very Suitable), as shown in Table 5. Based on these criteria, the media/display expert validation result of 80% falls into the "Suitable" category, the material expert validation result of 81% falls into the "Very Suitable" category, and the user response result of 97% also falls into the "Very Suitable" category. Therefore, it can be concluded that the augmented reality picture storybook is highly feasible for use as a literacy learning medium, as supported by positive expert evaluations and excellent student feedback.

Table 5. Feasibility Achievement Categories

No	Score in percent	Classification of eligibility
1	0-20%	Highly ineligible
2	21-40%	Ineligible
3	41-60%	Moderately eligible
4	61-80%	Eligible
5	81-100%	Highly eligible

Final Product Review

The development of learning media in the form of Augmented Reality (AR)-based storybooks was carried out to improve student literacy through creative and innovative approaches. This book not only presents illustrated stories, but is also complemented by AR technology that allows users to view three-dimensional (3D)

objects through the markers provided. During the development stage, the content of this book was written by students, who wrote about their own experiences or imaginations. The narratives were then combined with image designs to strengthen the storyline. This book consists of several main sections, namely the opening page featuring the Pasir Pengaraian University logo, the application title, and an interactive menu in the form of 3D buttons. Next, there is a learning objectives page that contains the competencies to be achieved, a user guide page that provides practical guidance for users, a material page that presents the core of the story in pictures, a 3D AR page that displays AR-based three-dimensional objects through specific markers, an exercise page that serves to measure student understanding, and a page about the application that contains background information, objectives, and developer profiles.

During the implementation phase, the media was tested on 10 students out of a total of 45 second-semester Information Systems students at Pasir Pengaraian University in the 2025/2026 academic year. The trial was conducted in the Indonesian Language course. Students were first introduced to the media, then instructed to create stories and design images independently using the Canva application. The evaluation stage was conducted to assess the suitability and effectiveness of the media in improving student literacy. The instruments used were questionnaires validated by media experts, subject matter experts, and user response questionnaires. The results of the media expert validation or display showed a score of 50 out of a total of 60, with a percentage of 80%. Based on the classification, these results fall into the eligible category. The aspects assessed include font readability, display quality, text clarity, AR functionality, and design suitability. In general, this media is good, although there are notes for improving visual quality.

4. Conclusion

Based on the results, it can be concluded that the developing of Augmented Reality (AR)-based picture storybooks integrated with the Canva design application is eligible and effective as a literacy learning tool. The development process was carried out using the ADDIE model, which includes the stages of needs analysis, design, development, implementation, and evaluation, resulting in a product that meets the learning needs of the digital era. The validation results show that media experts gave a score of 80% in the “Eligible” category, subject matter experts gave a score of 81% in the “Highly Eligible” category, while user responses obtained a percentage of 97% in the “Highly Eligible” category. This confirms that the developed media not only has an attractive and interactive visual appearance, but is also relevant to learning objectives and easy for students to understand. Additionally, the use of AR technology enhances the appeal, engagement, and understanding of students toward the story content. Thus, this AR-based picture storybook media is proven to be highly eligible for use as an innovative alternative to enhance literacy skills, while also serving as one of the solutions to address the low reading interest among students in the digital era.

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