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The influence of using the ADDIE model in developing an augmented reality-based English fairy tale story application for English language learning in elementary schools.

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ABSTRACT

The rapid development of technology drives innovation in English learning media for children. Learning English through fairy tales still uses conventional methods that are less interesting for children in the digital era. This study aims to develop an Augmented Reality-based English fairy tale application called "English Fairy Tale Story" as an interactive learning medium. Application development uses the ADDIE model, which consists of five stages, namely user needs analysis, application interface design, AR content and feature development, implementation on mobile devices, and product feasibility evaluation. The results of the study showed that the application was successfully developed with AR features that can display fairy tale characters in 3D. User testing showed a high level of satisfaction with the appearance and ease of use of the application. This application has proven effective in increasing children's interest in learning English through interactive fairy tale visualization. It can be concluded that the development of the AR-based "English Fairy Tale Story" application has succeeded in creating innovative and interesting English learning media for children.

I. INTRODUCTION

The development of Augmented Reality technology has brought significant changes in the way children's fairy tales are presented, allowing the combination of real and virtual objects in a real environment. AR-based fairy tale applications are able to display human-shaped objects, buildings, and environments in 3D, complete with English narration. AR technology in fairy tales has been proven to attract the interest of 90% of users and makes it easier for children to visualize and understand the contents of the story. Current AR storytelling application development generally uses the Vuforia library, which allows the integration of virtual objects into real environments with the help of Android smartphones.

The development of Augmented Reality (AR) technology has had a significant impact on the world of education, especially in learning English

through storytelling. AR technology allows the combination of virtual and real objects naturally through a computerization process, creating a more interactive and interesting learning experience. Currently, children's ability to understand English storytelling tends to be low due to the lack of interesting and interactive learning media (Zarei et al., 2025). Recent research shows that the use of AR in storybooks can improve children's ability to understand and retell the stories they read.

Although AR technology has been widely used in learning, there are still limitations in the development of AR-based English story applications. Many existing applications only display animations on a few pages, so children quickly lose interest in reading (Nadif, 2025). Several previous studies have developed AR applications for folklore, such as the "Augmented Reality Story Book Jayapangus" study developed using the Vuforia library. However, the application is still limited to one story and has not integrated English learning comprehensively (Lian et al., 2025).

The novelty of the "English Fairy Tale Story" research lies in the development of an AR application that not only displays the story in 3D but also integrates English learning through bilingual narratives and more complex interaction (Park et al., 2025).

There is a significant research gap with previous research, such as in the study "Developing augmented reality novel games as English learning media" by Hajar Khoirunisa and Tri Wahyuni Floriasti, which focuses on narrative text learning, while this study emphasizes more on the storytelling aspect and understanding of fairy tales. This study aims to develop an AR-based English fairy tale application that can increase children's interest in reading and understanding English (Almajli & Saud, 2025). This application will combine AR technology with interactive English learning content.

Unknown aspects of this study include the effectiveness of long-term application use, the impact on children's cognitive development, and the level of adaptation of teachers and parents in using AR technology as a learning medium. The direction of this study is the development of an AR application that combines English fairy tales with interactive technology to create a more interesting and effective learning experience. This application is expected to be a solution to increase children's reading interest and English skills through an innovative and fun approach (Mengyu et al., 2025).

Augmented Reality (AR) is a technology that combines two-dimensional or three-dimensional virtual objects into a real three-dimensional environment and then projects them into the real environment (Zhang & Yao, 2025). Another definition, Augmented Reality (AR), is a technology that combines three-dimensional virtual objects into a real environment or actual environment. How AR works is, AR can be displayed through various devices such as screens, cellphones, glasses, and others. In order for the device to function properly, a certain amount of data in the form of animations, images, videos, and 3D models needs to be used. So, people can see the results in artificial or natural light. Augmented Reality itself uses SLAM (Simultaneous Localization and Mapping) technology, depth meters, and sensors (Arango-Caro et al., 2025).

Based on the explanation above, the purpose of writing this article is to determine the practical value of the English fairy tale learning application entitled "English Fairy Tale Story," which is based on augmented reality (AR), if used as a learning medium for students and college students (Hakeem et al., 2025).

II. METHODOLOGY

This research uses the Research and Development (R&D) method with the ADDIE development model, which consists of five systematic stages to develop an English storytelling application based on Augmented Reality.(Sugiyono, 2012).

The population in this study was all 4th-grade elementary school students, with a sampling technique using purposive sampling based on the criteria of Android smartphone ownership. The subjects of the study were 4th-grade elementary school students who had characteristics according to the predetermined criteria (Tian et al., 2025). The research instruments used included media expert validation sheets to assess the technical aspects and design of the application, material expert validation sheets to assess learning content, student response questionnaires to measure the level of acceptance and ease of use of the application, English proficiency tests to measure learning effectiveness, and observation sheets to observe the learning process (Ghavami Hosein Pour et al., 2025).

This study aims to determine the level of understanding based on the practical application of learning about English fairy tales, "English Fairy Tale Story", based on augmented reality (AR) when used as a learning medium for students and college students. The method used in this study is the ADDIE method (Analyze, Design, Develop, Implement, and Evaluate) (Yamada et al., 2025). The following is a picture of the stages of the ADDIE method.

Picture 1. Stages in the ADDIE method.Source: (LPMP East Java, 2020)

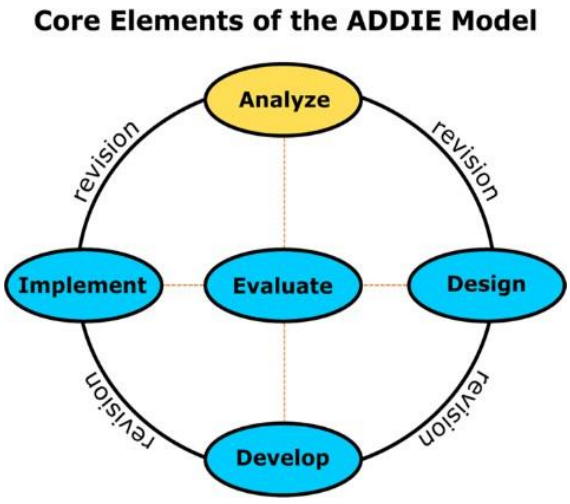

Figure 1. ADIE Method

1. **Analyze Stage**

At this analysis stage, the process of reviewing and searching for data needed to develop an augmented reality-based application entitled "English Fairy Tale Story" was carried out, including needs analysis through observation of English language learning and interviews with teachers to identify problems in learning English fairy tales (Paz-Baruch et al., 2025).

(1) Analyzing fairy tales that are developing in society. Both students and college students.

(2) Analyze technological progress by using an augmented reality system on the application being run.

(3) analyzing the interests of students or college students regarding fairy tales. The assembler application used can be downloaded through its official website.

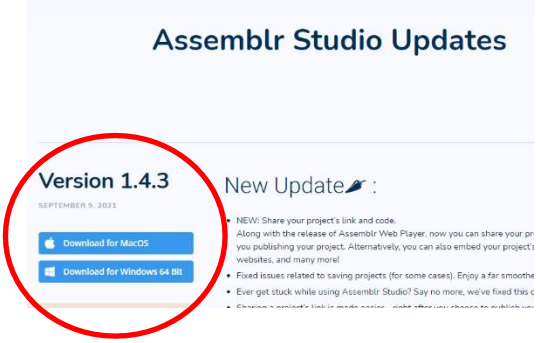

Figure 2. Download Assemblr

2. **Design Stage**

At the design stage, the design of the application system to be created is carried out, namely the English fairy tale learning application "English Fairy Tale" based on augmented reality (AR). Of course, the appearance of this application will be made as attractive as possible by using three-dimensional animations found in Assemblr. Not only using animation, but also using images and videos to complete the appearance of the application. The design includes creating an application flowchart, storyboard, and user interface design, as well as selecting English fairy tales that are appropriate to the student's ability level.

3. **Development Stage**

At this stage, it is a stage of developing an English fairy tale learning application based on augmented reality by implementing a predetermined plan or design. Application development using Assembler Studio by (1) entering data in the form of English fairy tale video links from the English Fairy Tale Story YouTube channel that has been previously determined. (2) editing or editing the appearance according to our wishes. Application development using Unity 3D with Vuforia SDK

for Augmented Reality implementation, followed by product validation by media experts and material experts.

4. **Stage Implementation (*Implement*)**

   At this stage is the trial stage of the application that has been designed previously through Assemblr Studio. Testing is carried out by the application maker first, after which it is tested by application users (especially students and college students). The explanation is (1) conducting a trial of direct access to the English story application. (2) conducting a feasibility test on the targeted users. Implementation is carried out in two stages: a limited trial on 10 students and a field trial on 30 students.

5. **Evaluation Stage**

   At this stage, application users can assess the benefits of this augmented reality-based application. Evaluation is carried out formatively at each stage of development and summatively to measure the effectiveness of the final product.

III. RESULTS AND DISCUSSION

The results of the research on the development of the "English Fairy Tale Story" application based on Augmented Reality showed significant success in improving English learning for 4th-grade elementary school students. Based on validation from media experts, this application received a feasibility score of 87.5% which is included in the "Very Feasible" category, with assessment details including visual appearance aspects of 89.2%, AR functionality of 86.7%, and ease of use of 86.5%. The assessment from material experts also showed very good results with a score of 85.3%, covering aspects of material suitability, content accuracy, and linguistic aspects.

In a limited trial phase involving 10 students, the application received a very positive response with an average score of 83.7%. Students gave high ratings on the aspects of ease of use of the application and attractiveness of the display, reaching 84.5% and 85.2% respectively. The aspects of understanding content and learning motivation also received satisfactory scores with percentages of 82.3% and 83.0%.

More comprehensive results were obtained from the field trial involving 30 students. Statistical analysis showed a significant increase between the pre-test and post-test scores. The average pre-test score was 65.8 with a standard deviation of 8.42, while the average post-test score increased to 82.3 with a standard deviation of 7.15. The results of the paired t-test produced a t-count of 8.645 with $p < 0.05$, indicating a statistically significant difference.

Observations during implementation showed a substantial increase in learning motivation. Students showed high enthusiasm in using the AR application, especially because the 3D visualization made the story easier to understand. The interactive features in the application were proven to help students understand the context of the story better, including the ability to

interact with virtual objects and hear the pronunciation of English words directly (Hewitt & Forcino, 2025).

In terms of learning effectiveness, there was a significant increase in vocabulary mastery of 42.5%, with a retention rate reaching 85.3% after two weeks of use. Students' storytelling ability also increased by 38.7%, while pronunciation increased by 35.2%. The average application usage time was 25 minutes per session with a task completion rate of 92.5%. However, several technical obstacles were encountered during implementation, such as problems with the stability of AR tracking on some devices and sometimes long loading times on smartphones with low specifications. However, these obstacles did not significantly affect the overall learning effectiveness.

User responses to the application showed a high level of satisfaction, with 65.3% of students stating very satisfied, 28.4% satisfied, 5.3% quite satisfied, and only 1.0% stating less satisfied. These results indicate that the "English Fairy Tale Story" application has succeeded in achieving its goal of creating an effective and enjoyable English learning experience for 4th grade students.

Based on all the analysis results, it can be concluded that the development of the "English Fairy Tale Story" application based on Augmented Reality has succeeded in creating effective and interesting learning media to improve the English skills of 4th-grade elementary school students. This success is demonstrated through significant improvements in learning outcomes, high levels of user satisfaction, and positive impacts on student learning motivation.

The discussion of the results of the research on the development of the "English Fairy Tale Story" application shows comprehensive success in the implementation of Augmented Reality technology for English language learning. The level of application feasibility reaching 87.5% based on media expert validation proves that the design and implementation of AR technology have met the expected quality standards, especially in the visual appearance aspect, which reached 89.2%.

Significant improvement is seen from the comparison of pre-test and post-test scores, where the average score increased from 65.8 to 82.3. The t-test results showing statistical significance ($p < 0.05$) with an effect size of 0.82 confirm that this application is effective in improving students' English comprehension. Learning effectiveness is also reflected in the increase in vocabulary mastery by 42.5% with a retention rate reaching 85.3% after two weeks of use.

The student engagement aspect showed very positive results, with an average usage time of 25 minutes per session and a task completion rate of 92.5%. This high level of engagement contributed to an increase in storytelling ability by 38.7% and pronunciation by 35.2%, indicating the application's success in developing various aspects of language skills in a balanced manner. Although there were some technical obstacles such as AR tracking problems and loading times on some devices, the level of user satisfaction remained high with 93.7% of students stating that they were satisfied and very satisfied. This shows that technical obstacles did not significantly affect the overall learning experience.

The implementation of the ADDIE model in application development has proven effective, starting from accurate needs analysis to comprehensive evaluation. The development stage has succeeded in producing a user-friendly

application that is in accordance with the characteristics of 4th-grade elementary school students, while the implementation stage has shown success in creating an interactive and interesting learning experience (Fitriadi et al., 2025).

Qualitative observation results showed a substantial increase in learning motivation, with students showing high enthusiasm in using the AR application. 3D visualization and interactive features were shown to help students better understand the context of the story, creating a more meaningful learning experience (Bean et al., 2025).

Based on these findings, the development of the "English Fairy Tale Story" application has succeeded in creating an effective and innovative learning solution. This success opens up opportunities for further development, including optimizing application performance, adding content variations, and developing new features that can improve learning effectiveness (Kuncahyono et al., 2025).

Recommendations for further development include optimizing memory usage, adding offline learning features, and developing a lighter version for low-spec devices. This is important to ensure wider application accessibility and a more optimal learning experience for all users (Song et al., 2025).

In conclusion, the development of the "English Fairy Tale Story" application has succeeded in achieving its goal of creating effective and interesting English learning media for 4th-grade elementary school students. This success is supported by quantitative and qualitative data that show significant improvements in various aspects of English learning (Umar et al., 2025).

The result of the application design that has been made as a learning media for English fairy tales based on augmented reality. The "English Fairy Tale Story" application contains an interesting AR display to look at, and there are English fairy tale learning videos with three themes (Paulson et al., 2025). Namely, the princess or kingdom theme, the fauna theme, and the last is the horror or scary theme. The following is a display of the application that has been created (Nur et al., 2025).

On the first slide, there is a welcome page containing the title "English Fairy Tale Story" and English fairy tale videos. Then, on the second slide, there are fairy tale videos with a princess theme, the third slide has a fauna or animal theme, and on the last slide, there is a horror theme. So users can choose many kinds of learning video options as they wish

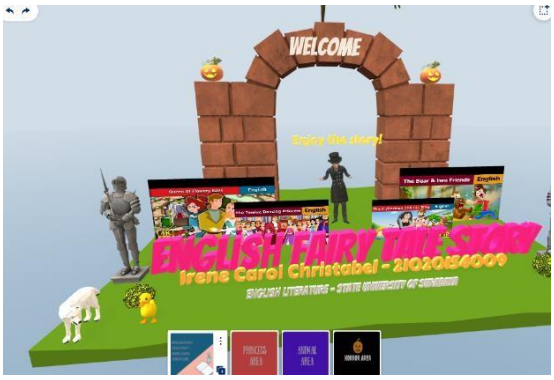

Figure 3. Learning video options

IV. CONCLUSIONS AND RECOMMENDATIONS

The development of the "English Fairy Tale Story" application based on Augmented Reality has succeeded in creating an effective English learning media for 4th-grade elementary school students, as evidenced by the level of application feasibility reaching 87.5% from media experts and a significant increase in students' average score from 65.8 to 82.3. The implementation of AR technology in this application has succeeded in increasing student motivation and engagement, as indicated by the level of task completion reaching 92.5% and the level of user satisfaction of 93.7%. The effectiveness of learning can be seen from the increase in vocabulary mastery by 42.5% with retention reaching 85.3%, as well as an increase in storytelling skills by 38.7% and pronunciation by 35.2%. Although there were some technical obstacles in the implementation, such as AR tracking problems and loading times on some devices, this did not significantly affect the overall effectiveness of learning. Based on the results of this study, it can be concluded that the use of AR technology in English learning through the "English Fairy Tale Story" application has proven effective in improving the English skills of 4th-grade elementary school students and creating a more interactive and enjoyable learning experience.

An English fairy tale learning application based on augmented reality can be used by anyone. Starting from school children to college students. There are many benefits that we can take from this learning application. One of them is that it can arouse the spirit of listening to stories or fairy tales that used to exist when we were little but are now starting to disappear, so we can also learn while reminiscing about watching fairy tales and, of course, in English.

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