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The Effect Of Digital Pop-Up Book Media On The Fairy Tale Reading Literacy Skills Of Elementary School Students

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Abstract

This study aims to examine the effect of digital pop-up book media on elementary school students' fairy tale reading literacy skills. This study used a quantitative approach with a quasi-experimental method and a pretest-posttest control group design. The research sample consisted of 60 second and third grade students of Tulungrejo Elementary School who were divided into an experimental group and a control group based on age equality. The experimental group received learning using digital pop-up book media, while the control group used conventional books. The research instruments included a reading literacy ability test, observation, and a questionnaire. The results of the descriptive analysis showed that the average score of the experimental group increased from 66.50 to 84.33 or by 17.83 points, while the control group increased from 64.00 to 71.00 or by 7.00 points. The results of the Normalized Gain (N-Gain) analysis showed that the experimental group obtained a score of 0.532 (medium category), while the control group obtained a score of 0.194 (low category). The results of the Independent Samples t-test showed a t value = 4.509, Mean Difference = 13.333, and Sig. (2-tailed) value = 0.000 ($p < 0.05$), so the research hypothesis was accepted. These findings indicate that digital pop-up book media is more effective than conventional media in improving elementary school students' fairy tale reading literacy skills through interactive visual presentations that support understanding of the reading content.

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Keywords: Digital Pop-Up Book; Reading Literacy; Fairy Tales; Digital Learning Media; Elementary School Students.

INTRODUCTION

Reading literacy is a crucial skill that must be instilled in elementary school students, as it serves as the primary foundation for mastering information, developing imagination, and supporting academic achievement in various subjects, particularly in Indonesian language, particularly in the area of fairy tales. However, in reality, some lower-grade students still struggle to understand text content, identify characters, plots, settings, and moral values within fairy tale narratives. This situation is often caused by the use of less innovative learning media that still focus on conventional textbooks, thus preventing students' reading motivation from developing optimally. Meanwhile, lower-grade students are still at the concrete operational stage of development, so they understand material more easily through visual, kinesthetic, colorful stimuli, and direct interaction. Therefore, innovation in learning media is crucial to provide a fun, contextual, and adaptive reading experience that is appropriate to the students' age characteristics (Susanti, 2021).

One learning medium that shows extraordinary potential is the digital pop-up book, a technology-based interactive media innovation that combines text, three-dimensional illustrations, animation, and interactive elements. This media is effective in increasing students' attention span during reading, facilitating comprehension of narrative content, and fostering learning motivation, as it provides a far more engaging reading experience than conventional print media. Previous empirical studies have confirmed the high validity and practicality of digital pop-up books for elementary school learning contexts, given their ability to stimulate students' cognitive processes (Fatmawati & Janattaka, 2025). Furthermore, the use of this media has been shown to significantly impact elementary school students' writing skills, implicitly demonstrating its potential for strengthening language skills holistically, including reading literacy (Putri & Nuroh, 2025).

Setyaningsih & Handayani (2023) stated that digital pop-up books have proven effective in Indonesian language lessons for improving reading literacy in lower-grade students. Their effectiveness is reflected in increased student interest in accessing, observing, and processing narrative content, which indirectly enriches reading skills while stimulating students' cognitive processes. The three-dimensional representation and engaging visual elements in this media

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increase students' focus on the reading material, resulting in superior performance compared to conventional textbooks. Another study by Kirana & Ninawati (2023) on digital literacy-based pop-up book media showed a significant difference in students' abilities before and after using the media. After use, lower-grade students' speaking skills significantly improved. The results of this study confirm that the integration of digital technology into pop-up book media creates a more interactive learning experience, thus encouraging students to actively construct narrative understanding, express opinions, and engage in communication. Given its effectiveness in speaking skills, this media is highly relevant for strengthening literacy in reading fairy tales, as both intersect in the dimension of language comprehension.

A comparative study by Zelahayani et al. (2026) revealed that digital pop-up books resulted in higher final exam scores for junior high school students on fairy tales compared to e-books. Digital pop-up books were proven to be more effective in stimulating students' attention, engagement, and comprehension of narrative content. This reinforces the advantages of animation, three-dimensional visuals, and interactivity in digital pop-up books, which are empirically superior in facilitating mastery of storylines, characters, settings, and moral messages compared to conventional digital text media. Furthermore, a systematic literature review by Yusron & Sunanto (2026), which analyzed 15 articles, concluded that QR code-based digital pop-up books have high validity, optimal practicality, and a significant impact on improving learning outcomes and reading motivation among elementary school students. This medium successfully synergistically combines the advantages of print and digital media, creating a more engaging and interactive learning experience.

Furthermore, research by Islami et al. (2024) reinforced the effectiveness of this media, demonstrating that developing a PowerPoint-based digital pop-up book is highly feasible and has a positive impact on Indonesian language teaching at the elementary school level. This media effectively addresses student boredom, which often arises from reliance on conventional, less interactive textbooks. The integration of visual elements, animations, and three-dimensional (3D) representations in digital format not only attracts students' attention but also significantly improves the quality of the learning experience and motivates interaction with the material. The main advantage of this digital format, as explained in the study, lies in its ability to present content dynamically and structured, thus outperforming print media. Field trials recorded a high level of effectiveness, with student engagement reaching 93%. These findings demonstrate that digital pop-up books are a potential tool for stimulating student understanding and optimizing

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literacy learning objectives. In Indonesian language subjects, fairy tales play a strategic role as teaching materials relevant to children's lives, rich in character values, ideal for developing reading comprehension skills. Previous research has shown that digital pop-up books are highly effective in improving elementary school student learning outcomes (Nisak & Indarti, 2023).

Based on the review of several previous studies described above, it can be concluded that digital pop-up books have a positive impact on student learning outcomes, motivation, and reading interest. However, most previous research has focused on media development, product feasibility testing, and general learning outcome measurement. Research specifically examining the effect of digital pop-up books on the storytelling literacy skills of lower-grade elementary school students, particularly second and third graders, is still limited. Furthermore, previous research generally has not integrated digital interactive elements, three-dimensional visuals, and storytelling-based reading literacy activities into a unified learning process. In lower-grade students, they are transitioning from learning to read to reading to learn, thus requiring media that not only captures their attention but also develops their ability to understand, interpret, and summarize the content. Therefore, this study aims to examine the effect of digital pop-up books on the storytelling literacy skills of students at Tulungrejo Elementary School. This research is necessary because reading literacy is a crucial skill that underpins successful learning in all subjects. Low literacy skills in elementary school will impact students' difficulties in understanding information, thinking critically, and solving problems at subsequent levels of education. Therefore, innovative learning media are needed that can accommodate the cognitive developmental characteristics of elementary school-aged students while also adapting to the transformation of digital technology-based learning.

This research focuses on three main aspects. First, it not only measures learning outcomes but also specifically evaluates the effect of digital pop-up books on fairy tale reading literacy skills, based on reading literacy indicators: information retrieval, reading comprehension, evaluation and reflection, letter and word recognition, fluency, content comprehension, reading aloud, reading simple sentences, and summarizing content. Second, this study focuses on second and third grade elementary school students, an age group that is relatively rarely researched in digital pop-up book media, even though this phase is crucial for the development of basic literacy skills. Third, this study implements digital pop-up books as an interactive learning medium that combines three-dimensional illustrations, animation, audio narration, and integrated reading activities, thus not only increasing the learning appeal but also facilitating the process of

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constructing meaning during fairy tale reading. This approach provides a new perspective on the effectiveness of interactive digital media in improving reading literacy in elementary school.

Therefore, this research is expected to not only enrich empirical studies on the use of digital media in Indonesian language learning but also provide scientific evidence regarding the effectiveness of digital pop-up books in improving fairy tale reading literacy skills in lower grade elementary school students. The results of this study are expected to serve as a reference for teachers, schools, and future researchers in designing more innovative literacy learning, adapting to technological developments, and meeting the needs of students in the digital age. Therefore, this research is not only academically valuable but also makes a practical contribution to basic education.

Digital Pop-Up Book Media in Elementary School Learning

Learning media constitute one of the essential components of the educational process, serving as an intermediary for delivering instructional content to facilitate the achievement of learning objectives more effectively. The rapid advancement of digital technology has transformed conventional instructional media into interactive digital learning tools, one of which is the digital pop-up book. A digital pop-up book is an innovative development of the traditional pop-up book that integrates three-dimensional illustrations, animations, audio, video, and interactive features within a digital platform to create an engaging learning experience for elementary school students. The primary characteristic of this medium lies in its ability to present learning materials visually, dynamically, and contextually, thereby enhancing students' attention, motivation, and engagement during classroom instruction. According to Mayer (2021), multimedia learning becomes more effective when information is presented through a combination of text, images, narration, and animation because these elements optimize information processing within learners' working memory. This principle provides the theoretical foundation for the development of digital pop-up books, which utilize multiple multimedia elements to support meaningful learning experiences. At the elementary education level, interactive visual media play a significant role in supporting children's cognitive development. Based on Piaget's theory of cognitive development, children aged 7–11 years are in the concrete operational stage, during which they understand concepts more effectively through concrete visual representations than through abstract verbal explanations alone (Schunk, 2020). Consequently, the use of digital pop-up books is highly compatible with the developmental

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characteristics of elementary school learners. Beyond providing visually attractive learning materials, digital pop-up books enable students to interact actively by opening virtual pages, selecting objects, listening to narration, and responding to embedded questions. Such interactive activities enhance student engagement, which subsequently contributes to improved learning outcomes. Branch and Dousay (2022) argued that interactive digital learning media effectively increase students' attention because they simultaneously involve visual, auditory, and kinesthetic learning modalities. Within Indonesian language instruction, digital pop-up books not only present reading texts but also enrich story comprehension through animated illustrations and sound effects, enabling students to understand the content more deeply. Yahzunka and Astuti (2022) reported that digital pop-up book media significantly improved elementary school students' fairy tale reading abilities because learners found it easier to identify the storyline, characters, setting, and moral messages embedded in the stories. These findings are supported by the systematic review conducted by Susanti (2021), which concluded that digital pop-up books represent an innovative instructional medium capable of improving reading motivation, reading comprehension, and overall literacy achievement among elementary school students. In addition to academic benefits, digital pop-up books also contribute to the development of twenty-first-century competencies, including creativity, communication, and digital literacy. The integration of technology into classroom learning encourages students to use digital devices productively while fostering essential digital competencies from an early age. This perspective aligns with the Partnership for 21st Century Learning (P21, 2020), which emphasizes the importance of integrating information technology into educational practices to prepare students for future learning and professional demands. Teachers likewise benefit from digital pop-up books because these media facilitate more engaging instructional delivery, reduce reliance on traditional lecture-based teaching methods, and create more active and enjoyable classroom environments. Therefore, digital pop-up books can be regarded as an innovative instructional medium that integrates multimedia learning principles, children's developmental characteristics, and the educational demands of the twenty-first century to improve learning effectiveness in elementary schools. Numerous empirical studies consistently demonstrate that digital pop-up books enhance students' motivation, attention, conceptual understanding, and academic achievement, making them an effective alternative instructional medium for Indonesian language learning, particularly in teaching fairy tale reading, where comprehensive story comprehension is essential (Mayer, 2021; Branch & Dousay, 2022; Yahzunka & Astuti, 2022; Susanti, 2021; OECD, 2021).

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Fairy Tale Reading Literacy Skills among Elementary School Students

Reading literacy refers to an individual's ability to understand, interpret, evaluate, and utilize information obtained from various types of texts to achieve specific goals and actively participate in society. At the elementary school level, reading literacy serves as the fundamental basis for students' learning across all subject areas. The Organization for Economic Co-operation and Development (OECD, 2023) defines reading literacy as the ability to understand, use, evaluate, reflect on, and engage with texts in order to develop knowledge, achieve personal goals, and participate effectively in society. This definition indicates that reading literacy encompasses not only the ability to decode written words but also the capacity to think critically about textual content. One of the literary genres commonly introduced in elementary Indonesian language instruction is the fairy tale. Fairy tales are fictional narratives containing moral values, cultural wisdom, character education, and life lessons that function as effective tools for both language development and character formation. Through fairy tale reading activities, students are expected to identify characters, character traits, settings, plot, conflicts, resolutions, and moral messages while constructing comprehensive interpretations of the stories. These competencies require learners to develop literal, inferential, critical, and evaluative reading comprehension skills. According to Snow (2021), reading comprehension results from the interaction among language proficiency, prior knowledge, reading strategies, and text characteristics. Consequently, students' success in understanding fairy tales is strongly influenced by instructional quality, learning media, and teaching strategies implemented by teachers. Despite ongoing educational reforms, low reading literacy among elementary school students remains a major challenge in many countries, including Indonesia. The Program for International Student Assessment (PISA) consistently reports that Indonesian students' reading performance remains below the OECD average, highlighting the urgent need for innovative instructional approaches capable of improving students' reading interest and comprehension from the primary education level (OECD, 2023). One widely recommended strategy involves the integration of visual and digital learning media because such media help students transform abstract information into concrete and meaningful learning experiences. In fairy tale instruction, attractive visual illustrations support students in constructing mental imagery, connecting story events with real-life experiences, and retaining information more effectively. Duke and Cartwright (2021) argued that visual instructional supports enhance reading comprehension because learners process verbal and visual information simultaneously, thereby strengthening

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text understanding. Digital pop-up books embody these characteristics by combining written texts, three-dimensional illustrations, animation, narration, and interactive multimedia features that facilitate deeper story comprehension. In addition to improving reading comprehension, digital pop-up books significantly increase students' motivation to read by providing enjoyable, engaging, and interactive learning experiences. Yahzunka and Astuti (2022) found that students who learned using digital pop-up books demonstrated greater improvement in identifying intrinsic elements of fairy tales than students who used conventional instructional media. Similar findings were reported by Susanti (2021), who concluded that digital pop-up books effectively improved reading comprehension, reading interest, and students' active participation during classroom instruction. Furthermore, fairy tale reading literacy is closely associated with students' character development because the moral values embedded within stories can be understood more deeply through meaningful reading experiences. Therefore, improving reading literacy contributes not only to students' academic achievement but also to the development of positive character traits, critical thinking skills, and lifelong learning competencies. Based on existing theoretical perspectives and previous empirical studies, it can be concluded that fairy tale reading literacy represents a fundamental competency that should be cultivated from the elementary school level, and the implementation of digital pop-up book media constitutes an effective instructional innovation for enhancing reading comprehension, reading motivation, and students' overall learning outcomes in a sustainable manner (Snow, 2021; Duke & Cartwright, 2021; OECD, 2023; Yahzunka & Astuti, 2022; Susanti, 2021).).

RESULTS AND DISCUSSION

Results

A. Prerequisite Tests

In quantitative research, prerequisite analysis tests are conducted before hypothesis testing to ensure that the data meet the assumptions required for the use of parametric statistics. The prerequisite tests commonly employed in experimental research include the normality test and the homogeneity test. These tests are intended to determine the characteristics of data distribution and the equality of variances between groups, thereby ensuring that the selected analytical method is appropriate for the characteristics of the data (Usmadi, 2020).

The research data were obtained through observations of students' reading literacy skills using pretest scores (before the intervention) and posttest scores (after the intervention) for

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combined Grade II and Grade III students of SDN Tulungrejo. The students were then divided into two groups and balanced according to age so that both groups had equivalent compositions. The experimental group consisted of 30 students, including 13 children aged 8 years and 17 children aged 9 years. The control group also consisted of 30 students with the same age composition, namely 13 children aged 8 years and 17 children aged 9 years. This age balancing was carried out to minimize the influence of factors resulting from natural cognitive development, thereby allowing differences in students' learning outcomes to be more accurately attributed to the instructional intervention provided. The experimental group received instruction using digital pop-up book media in the Indonesian language subject on the topic of "Fairy Tales," whereas the control group received instruction using the conventional lecture method and standard textbooks (the method commonly implemented by the teacher). The descriptive analysis results of the pretest and posttest scores for both the experimental and control groups are presented in the table below.

Table 1. Descriptive Analysis Results of the Experimental and Control Groups

Descriptive Statistics	N	Range	Minimum	Maximum	Mean	Std. Deviation	N-Gain
Experimental Pretest	30	60	30	90	66.50	14.453	0.532
Experimental Posttest	30	40	60	100	84.33	10.317	
Control Pretest	30	55	30	85	64.00	14.227	0.194
Control Posttest	30	50	40	90	71.00	12.484	
Valid N (listwise)	30						

Based on the table above, the mean pretest scores of both groups were relatively balanced and nearly identical. In the experimental group, the pretest scores showed a minimum value of 30, a maximum value of 90, and a mean of 66.50. After receiving the intervention using digital pop-up book media, the posttest scores increased to a minimum value of 60, a maximum value of 100, and a mean of 84.33. Thus, the experimental group achieved an average score improvement of 17.83 points, indicating a significant improvement in fairy tale reading literacy skills after using the digital pop-up book learning media. Meanwhile, in the control group, which received conventional instruction, the pretest scores showed a minimum value of 30, a maximum

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value of 85, and a mean of 64.00. Following the learning process, the posttest scores increased to a minimum value of 40, a maximum value of 90, and a mean of 71.00. However, the control group achieved an average score improvement of only 7.00 points, which was considerably lower than the 17.83-point improvement observed in the experimental group. The N-Gain calculation results showed that the experimental group, which used digital pop-up book media, obtained an N-Gain score of 0.532 or 53.2%, which falls into the moderate category. This indicates that the digital pop-up book media was sufficiently effective in improving students' fairy tale reading literacy skills. In contrast, the control group, which used conventional textbooks, obtained an N-Gain score of 0.194 or 19.4%, which falls into the low category. Therefore, the improvement in fairy tale reading literacy skills in the experimental group was higher than that of the control group.

Overall, the data indicate that both groups experienced improvements in learning outcomes; however, the improvement in the experimental group was substantially greater than that in the control group. These findings demonstrate that the use of digital pop-up book media is more effective in enhancing elementary school students' fairy tale reading literacy skills than conventional instructional methods using standard textbooks. In addition to increasing the average scores, this learning media also enabled students to achieve a higher maximum score of 100, compared with the control group, whose maximum score was only 90.

Normality Test

The normality test is one of the prerequisite tests in parametric statistical analysis that aims to determine whether the research data are normally distributed. A normal distribution indicates that the data follow a bell-shaped curve, thereby satisfying the fundamental assumption for the application of parametric statistical analyses, such as the Independent Samples *t*-test. When the data are normally distributed, parametric analysis can provide more accurate and reliable estimates. To ensure the appropriate selection of the analytical technique, the Shapiro–Wilk normality test was employed because the sample size in each group was fewer than 50 students. Therefore, this test was considered appropriate for examining whether the pretest and posttest data in each group were normally distributed. The results of the normality test are presented in the following table.

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Table 2. Results of the Normality Test

Group	Kolmogorov–Smirnov Statistic	df	Sig.	Shapiro–Wilk Statistic	df	Sig.
Experimental Pretest	0.096	30	0.200*	0.965	30	0.412
Experimental Posttest	0.126	30	0.200*	0.959	30	0.296
Control Pretest	0.130	30	0.200*	0.948	30	0.151
Control Posttest	0.135	30	0.173	0.947	30	0.145

Based on the data above, the significance (Sig.) value for the experimental group pretest was 0.412, the experimental group posttest was 0.296, the control group pretest was 0.151, and the control group posttest was 0.145. All significance values exceeded the 0.05 significance level. Since all significance values were greater than Sig. > 0.05, it can be concluded that the pretest and posttest data for both groups were normally distributed. This condition satisfies one of the primary assumptions for parametric statistical analysis, thereby allowing hypothesis testing using the Independent Samples *t*-test. These findings indicate that the distribution of students' scores in both the experimental and control groups followed a natural pattern without excessive deviation, making comparisons between the two groups more accurate and reliable.

Homogeneity Test

Furthermore, the homogeneity test in this study was conducted using Levene's Test. This test aimed to verify whether the variances of the data between the experimental and control groups were homogeneous or equal. Equality of variance is an essential prerequisite for applying the Independent Samples *t*-test as the next step in the analysis, ensuring that comparisons between groups are more accurate and reliable. The results of the homogeneity test are presented in the table below.

Table 3. Results of the Homogeneity Test

Test of Homogeneity of Variance	Levene Statistic	df1	df2	Sig.
Based on Mean	0.726	1	58	0.398
Based on Median	0.815	1	58	0.370

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Based on Median and with Adjusted df	0.815	1	55.687	0.370
Based on Trimmed Mean	0.787	1	58	0.379

Based on the results above, the significance (Sig.) value Based on Mean was 0.398, Based on Median was 0.370, Based on Median and with Adjusted df was 0.370, and Based on Trimmed Mean was 0.379. All significance values exceeded the 0.05 significance level. Since Sig. > 0.05 for all results, it can be concluded that the variances between the experimental and control groups were homogeneous, indicating relatively balanced variability between the two groups. This finding suggests that the distribution of students' scores in both groups was relatively uniform, thereby making statistical comparisons between the groups more valid. The fulfillment of the homogeneity assumption allows further hypothesis testing using the Independent Samples *t*-test. In addition, these results confirm that the age-based grouping process successfully created two equivalent groups in terms of the variability of students' abilities.

B. Hypothesis Testing

After the data were confirmed to be normally distributed through the normality test and to have homogeneous variances based on the homogeneity test, the analysis was continued with hypothesis testing using the Independent Samples *t*-test. The Independent Samples *t*-test is a parametric statistical test used to compare the means of two independent or unrelated groups. This test aims to determine whether there is a statistically significant difference between the mean scores of the two groups based on the variable under investigation. In experimental research, the Independent Samples *t*-test is commonly used to compare students' learning outcomes or abilities between the experimental group receiving the intervention and the control group receiving no intervention. The application of the Independent Samples *t*-test requires that the data be normally distributed and have homogeneous variances so that the test results can be interpreted validly. In this study, the test was applied to examine whether there were significant differences in the average reading literacy skills between the experimental and control groups, both before the intervention (pretest) and after the intervention (posttest). The results of the Independent Samples *t*-test are presented in the following table.

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Table 4. Independent Samples *t*-Test Results

	Levene's Test for Equality of Variances		t-test for Equality of Means					95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	0.726	0.398	4.509	58	0.000	13.333	2.957	7.414	19.252
Equal variances not assumed	—	—	4.509	56.011	0.000	13.333	2.957	7.410	19.257

Based on the results of the Independent Samples *t*-test presented above, the analysis yielded a *t* value of 4.509 with 58 degrees of freedom (*df*) and a Sig. (2-tailed) value of 0.000, which is smaller than the significance level of 0.05. Therefore, H_o was rejected and H_1 was accepted, indicating that there was a statistically significant difference in students' fairy tale reading literacy skills between the experimental and control groups. The Mean Difference value of 13.333 indicates that the average fairy tale reading literacy score of students in the experimental group was 13.33 points higher than that of the control group. Furthermore, the 95% confidence interval, ranging from 7.414 to 19.252, does not include zero, further strengthening the conclusion that the difference between the two groups is statistically significant. Therefore, it can be concluded that the use of digital pop-up book media had a significant positive effect on the fairy tale reading literacy skills of elementary school students compared with the use of conventional textbooks.

DISCUSSION

This study aimed to determine the effect of using digital pop-up book media on the fairy tale reading literacy skills of elementary school students. Based on the results of the statistical

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analysis, digital pop-up book media was proven to have a significant effect on improving students' fairy tale reading literacy skills. The descriptive analysis showed that the initial abilities (pretest) of both groups were relatively comparable. The experimental group had a mean pretest score of 66.50, while the control group had a mean score of 64.00. The relatively small difference in the mean scores indicates that the initial abilities of students in both groups were not substantially different before the intervention was administered. After the learning process, the mean posttest score of the experimental group increased to 84.33, whereas the control group only reached 71.00. Consequently, the experimental group demonstrated a mean improvement of 17.83 points, while the control group improved by only 7.00 points. These findings indicate that learning using digital pop-up book media produced greater improvements in learning outcomes than learning using conventional textbooks.

Before hypothesis testing was conducted, the data were first examined using normality and homogeneity tests as prerequisite assumptions for parametric analysis. The results of the Shapiro–Wilk normality test showed that all data had significance values greater than 0.05, indicating that the data were normally distributed. Furthermore, the homogeneity test using Levene's Test produced a significance value of 0.398, which was also greater than 0.05. These results indicate that the variances of the two groups were homogeneous. Since both assumptions were satisfied, the data met the requirements for analysis using parametric statistical tests.

The difference in improvement between the two groups was further confirmed by the results of the Independent Samples *t*-test. The analysis produced a Sig. (2-tailed) value of 0.000 (< 0.05), with a *t* value of 4.509 and a Mean Difference of 13.333. These results indicate that there was a statistically significant difference in fairy tale reading literacy skills between the experimental and control groups after the intervention was implemented. Therefore, the research hypothesis stating that digital pop-up book media has an effect on the fairy tale reading literacy skills of elementary school students was accepted. In addition, the results of the Normalized Gain (N-Gain) analysis showed that the experimental group achieved an average gain of 17.83, whereas the control group achieved an average gain of 7.00. These findings demonstrate that the effectiveness of learning using digital pop-up book media was higher than that of learning using conventional textbooks. The moderate category obtained by the experimental group indicates that the digital pop-up book media was sufficiently effective in improving students' reading literacy skills, whereas the low category obtained by the control group suggests that conventional instruction produced only limited improvement.

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The superiority of digital pop-up book media in improving fairy tale reading literacy skills can be explained by the characteristics of the media, which integrate text, illustrations, animations, and interactive elements. The engaging presentation of learning materials is capable of increasing students' attention and learning motivation, enabling them to understand the reading content more easily, identify characters, plot, setting, conflict, and the moral message contained in fairy tales. For elementary school students, particularly those in the lower grades, the use of visual and interactive media greatly facilitates the process of understanding information because, at this developmental stage, students still require concrete and engaging learning experiences. The findings of this study demonstrate that digital pop-up book media significantly improved the reading literacy skills of lower-grade students aged 8–9 years, who are still in the concrete operational stage of cognitive development. Students at this age are better able to absorb information through engaging visualizations, vivid animations, bright colors, and direct interaction, resulting in a deeper understanding of story characters, plot, setting, and the moral values presented in fairy tales. Furthermore, the engaging digital media successfully maintained students' attention throughout the reading process. These findings are consistent with Paivio's Dual Coding Theory (2008), which explains that information presented through a combination of verbal and visual representations is more easily understood and remembered than information presented solely in textual form. In the context of this study, the digital pop-up book media not only presented fairy tale texts but also incorporated illustrations and visual elements that supported students' comprehension of the story content, thereby enhancing their reading literacy skills.

The findings of this study are also consistent with previous research conducted by Yahzunka and Astuti (2022), who found that literacy-based digital pop-up book media had a significant effect on the fairy tale reading skills of second-grade students. A systematic review by Susanti (2021) also reported that digital pop-up book media support the development of reading literacy through engaging illustrations and stories that effectively capture the interest of elementary school students. Similarly, a study by Kirana and Ninawati (2023) demonstrated that digital pop-up book media not only improved students' reading literacy but also enhanced the speaking skills of lower-grade elementary school students, reflecting its holistic contribution to language development. Nevertheless, improvements in learning outcomes may also have been influenced by supporting factors such as students' high motivation resulting from exposure to a new learning medium, teachers' instructional management skills, a more engaging and enjoyable

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classroom atmosphere, and increased student attention during the intervention. However, the age-based grouping and matching procedure employed in this study minimized the influence of these factors.

In addition to being supported by theoretical perspectives, the findings of this study are consistent with numerous previous studies demonstrating that visually rich and interactive digital learning media can improve learning outcomes and literacy skills among elementary school students. However, this study offers a novel contribution by specifically examining the effect of digital pop-up book media on fairy tale reading literacy skills through an experimental design comparing an experimental group with a control group. Furthermore, the effectiveness of the instructional media was demonstrated not only through differences between pretest and posttest scores but also through N-Gain analysis, providing a more comprehensive understanding of the extent of improvement in students' literacy skills. Based on these findings, elementary school teachers are encouraged to utilize digital pop-up book media as an innovative alternative for teaching the Indonesian language, particularly fairy tale materials, in order to improve reading comprehension, foster students' interest in reading, and promote active participation during the learning process. This study further reinforces the theoretical perspective that interactive visual media are considerably more effective for elementary school students than conventional lecture-based instructional methods.

Overall, the findings indicate that the use of digital pop-up book media represents an effective instructional alternative for improving the fairy tale reading literacy skills of elementary school students. This learning media is capable of creating a more engaging learning experience, increasing students' involvement throughout the instructional process, and producing greater improvements in literacy skills than the use of conventional textbooks. Therefore, digital pop-up book media should be considered a valuable instructional innovation for supporting the enhancement of reading literacy in elementary schools.

CONCLUSION

Based on the results of the research and data analysis, it can be concluded that digital pop-up book media has a significant effect on elementary school students' fairy tale reading literacy skills. The results of the descriptive analysis show that the average reading literacy skills of the experimental group increased from 66.50 at the pretest to 84.33 at the posttest, with an increase of 17.83 points. Meanwhile, the control group that followed learning using conventional

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books only experienced an increase from 64.00 to 71.00 or by 7.00 points. These findings indicate that the increase in reading literacy skills in the group that used digital pop-up book media was higher than the group that used conventional learning. The results of hypothesis testing through the Independent Samples t-test showed a Sig. (2-tailed) value of 0.000 (<0.05), a t value = 4.509, and a Mean Difference of 13.333. These results prove a significant difference between the reading literacy skills of students in the experimental and control groups, so the research hypothesis (H_1) is accepted and the null hypothesis (H_o) is rejected. In addition, the results of the N-Gain analysis show that the experimental group obtained a score of 0.532, which is in the medium category, while the control group obtained a score of 0.194, which is in the low category. This indicates that digital pop-up book media is more effective in improving reading literacy skills compared to the use of conventional learning media. Overall, this study provides empirical evidence that the integration of digital pop-up book media that combines three-dimensional visuals, animation, and interactive elements can create a more engaging learning experience, increase student engagement, and help students understand the elements of fairy tales more deeply. These findings reinforce the importance of utilizing technology-based learning media in Indonesian language learning in elementary schools, especially to improve reading literacy skills in lower grade students. Therefore, digital pop-up book media is worthy of being recommended as an alternative learning innovation that can be implemented by teachers to support the strengthening of literacy culture in elementary schools and can serve as a reference for further research to develop interactive digital media in broader educational materials and levels.

FUTURE DIRECTIONS

Future research is recommended to investigate the long-term effectiveness of digital pop-up book media in improving students' reading literacy by employing longitudinal research designs that evaluate the sustainability of learning outcomes over time. In addition, future studies should involve larger and more diverse samples from different schools and regions to enhance the generalizability of the findings. Further research may also examine the effectiveness of digital pop-up book media across different grade levels, subject areas, and various types of reading materials beyond fairy tales. Moreover, integrating emerging technologies such as artificial intelligence (AI), augmented reality (AR), or gamification into digital pop-up book media may provide more interactive and personalized learning experiences, potentially leading to greater improvements in students' literacy skills, motivation, and learning engagement. Finally, future

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studies are encouraged to explore additional factors, including students' learning motivation, digital literacy, teacher competencies, and parental support, to better understand the mechanisms through which digital learning media influence literacy development in elementary education.

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