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Jurnal Penelitian Ilmu Pendidikan

Volume 17, Nomor 2, 23-38, 2024

Development of digital audio storybook media to improve early reading skills in first-grade elementary school students

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Abstract

This study aimed to develop and evaluate the feasibility, practicality, and effectiveness of a digital audio storybook as a learning medium for improving early reading skills in first-grade students. Conducted within the Trimulyo Cluster, Kapanewon Sleman, this Research and Development (R&D) study employed the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). Data were collected through interviews, observations, questionnaires, and reading assessments. Validation from experts indicated the media's feasibility, scoring an average of 3.8 from a material expert and 4.0 from a media expert. Practicality was confirmed through high average scores from teacher (94.44%) and student (ranging from 90.83% to 93.89%) feedback. Effectiveness was measured via a quasi-experimental design, showing an N-Gain score of 80.75% and a statistically significant improvement ($p < 0.05$). In conclusion, the developed digital audio storybook is proven to be feasible, practical, and effective for early reading instruction in primary education. It presents an innovative and impactful learning tool that can significantly support literacy development in young learners.

Keywords: Audio story book; early reading; digital media; elementary school students

How to Cite (APA): Arifa, N., & Herwin (2024). Development of digital audio storybook media to improve early reading skills in first-grade elementary school students. *Jurnal Penelitian Ilmu Pendidikan,17*(1), 23-38. doi: https://doi.org/10.21831/jpip.v17i1.91154

Received 07-12-2023; Received in revised from 07-01-2024; Accepted 09-02-2024

INTRODUCTION

Reading ability is a fundamental skill that must be possessed by primary school students, because all subjects require comprehension through reading. If this skill is not yet mastered, students will face obstacles in learning knowledge at the next levels (Mutohhari et al., 2021). However, the Indonesian Ministry of Education and Culture Regulation No. 14 of 2018 emphasizes that reading ability is not a prerequisite for entering elementary school, since young children are not yet obliged to master it. Ministry of Education and Culture Regulation No. 15 of 2018 emphasizes strengthening character education as the focus, while reading skills are developed gradually.

This approach is in line with the Independent Curriculum, which emphasizes competence development according to the students' developmental stage rather than mere mastery of basic literacy and numeracy. Grade I teachers have a crucial role in designing early reading instruction that is interesting and interactive. In the Phase A Indonesian Learning Outcomes, early literacy skills include interest in text, fluency in reading everyday words, understanding the content of readings, and the ability to interpret meaning with the aid of illustrations (Meliyawati, 2016).

First-grade students are at the early reading stage, namely recognizing letters, reading simple words and sentences, and gradually understanding reading content (Adawiyah & Fithriyani, 2022). However, many students have not grasped the relationship between letters and sounds, making it difficult for them to decode words and comprehend texts (Widyastuti, 2017). Teachers also remain the primary source of assistance in understanding text. Developmentally, Grade I students (ages 6–7 years) are in the early reading phase where oral language ability is stronger than independent reading. According to Chall's theory, by the end of Grade I students ideally reach Stage 2 – Confirmation and Fluency, meaning they can read simple texts and understand their meaning (Sustyorini, 2020). If this stage is not reached, innovative media appropriate to the child's developmental stage are needed.

The Synthetic Analysis Structure (SAS) method can be used in two stages: reading without books using visual media like word cards, and reading with books containing simple text (Hidayah & Novita, 2016; Saputra, 2012). Students who are not yet fluent readers require intensive guidance to be able to understand reading content. The National Reading Panel explains that reading skills involve the ability to listen, recognize language sounds (phonemic awareness), and mastery of vocabulary. The National Research Council identifies three main obstacles to reading, namely difficulty understanding the alphabetic principle, difficulty with oral text, and low motivation to read (Syahputri & Dafit, 2021). Therefore, media are needed that can connect written words with sounds, strengthen oral language comprehension, and increase motivation to learn.

Engaging media that suit the child's developmental stage are required to visualize abstract concepts (Adnan et al., 2016). A survey at SDN Trimulyo found that learning media were still limited to the student textbook and videos, so students needed intensive assistance and teacher creativity (Tjoe, 2013). Based on these findings, a digital audio storybook was developed, combining pictures, simple sentences, and expressive children's voices. This media helps students associate written text with corresponding sounds in accordance with the concrete operational cognitive stage, making the process of learning to read more enjoyable, interactive, and effective.

METHODS

This research was a development study using the Research and Development (R&D) approach. The development model adopted was the ADDIE model, which consists of five stages for effective and efficient instructional design: Analyze, Design, Development, Implementation, and Evaluation (Tegeh et al., 2014). The ADDIE model was carried out step by step to achieve the desired outcomes.

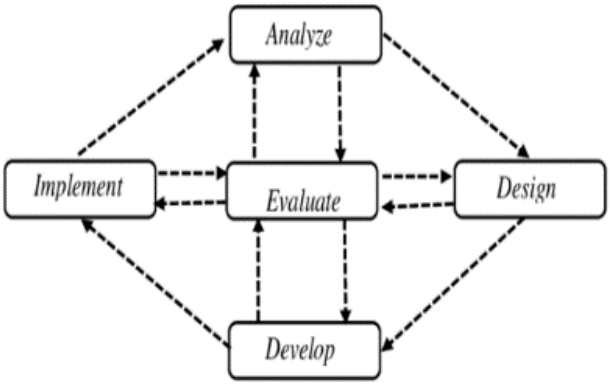

Figure 1. ADDIE model stages

Subjects and Development Procedures

The product developed is a Digital Audio Storybook media aimed at improving students' ability to read and understand simple expressive sentences. The target users were Grade I elementary students in the Trimulyo cluster of Sleman. The development process included several trial stages to evaluate the media's feasibility and refine it before full implementation.

One-to-One Trial

After the initial version of the media was deemed fit for testing by the material and media experts, an individual trial was conducted. Three students (one each of low, medium, and high reading ability) and one teacher were selected as subjects. The procedure involved explaining the assessment criteria to the students, having the students and teacher use the product, collecting their feedback via questionnaires, analyzing the feedback, and then revising the media based on the findings.

Small Group Trial

Following revisions from the one-to-one trial, a small group trial was carried out with 9 students (3 low, 3 medium, and 3 high-ability readers) and one teacher. In this stage, the students and teacher used the digital audio storybook and filled out response questionnaires. The results were analyzed to assess the media's use and the feedback from users, leading to further refinement of the media.

Field Trial

This stage aimed to determine if the product was ready to progress to broader implementation. The field trial involved one class of 18 students (approximately a full Grade I class in one school) and one teacher. Schools for the field trial were chosen by random sampling within the Trimulyo cluster, considering academic conditions, administration, teacher readiness, and school support. The five schools in Gugus Trimulyo (SD Negeri Trimulyo, SD Negeri Sidomulyo, SD Negeri Kadisobo 2, SD Negeri Kadisobo 3, and SD Negeri Panasan) were the population for sampling. The field trial evaluated whether the media functioned well in a typical classroom setting and if any further improvements were needed.

After the development trials, an implementation test of the media's effectiveness was conducted using a quasi-experimental design. Two classes were involved: an experimental class and a control class. The experimental class was Grade I of SD Negeri Trimulyo (23 students) which used the digital audio storybook in teaching, while the control class was Grade I of SD Negeri Sidomulyo (18 students) which used conventional learning methods. This nonequivalent control group design (pre-test and post-test with a control group) was employed to compare learning outcomes between the two groups. Both classes took a pre-test on early reading skills before the intervention, and a post-test after the experimental class used the storybook media (the control class did not use the new media). This trial was conducted using a quasi-experimental pre-test post-test design with a control group. The experimental design of the operational field trial is shown in the Figure 2.

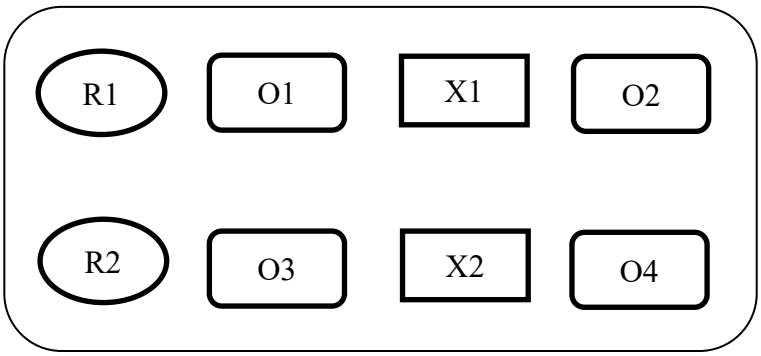

Figure 2. Trial design in the learning classroom

Description:
R1 : Experimental class
R2 : Control class
O1 : Initial reading skills test for the experimental class
O2 : Final reading skills test for the experimental class
O3 : Initial reading skills test for the control class
O4 : Final reading skills test for the control class
X1 : Learning using digital *books*
X2 : Learning using digital *audio story books*

Data Collection

Data were collected through multiple techniques: interviews, observations, questionnaires, tests, and documentation. In addition to written tests, a performance assessment instrument was used to measure students' early reading skills. The instruments used in this research and development included: (1) interview guides, (2) observation sheets, (3) questionnaires, and (4) reading skill tests. To ensure instrument quality, content validity was employed. The content validity of the instruments was assessed through expert judgment by a media expert and a material (subject matter) expert, who evaluated whether the content of each instrument was appropriate and sufficient.

Data Analysis

Data analysis utilized descriptive quantitative techniques, converting qualitative ratings from questionnaires completed by experts, students, and teachers into numerical scores on a Likert scale: Very Feasible (5), Feasible (4), Adequate (3), Less Feasible (2), and Not Feasible (1) (Sukmadinata, 2005). Average scores for each evaluation aspect were derived and interpreted following the five-point category scale, where an average score above 4.2 signifies "Very Feasible," 3.4–4.2 denotes "Feasible," 2.6–3.4 indicates "Adequate," 1.8–2.6 represents "Less Feasible," and below 1.8 classifies as "Not Feasible." In this study, a media product was deemed feasible if it scored at least in the "Adequate" category or higher.

Effectiveness evaluation involved analyzing reading skill pre-test and post-test data. Preliminary assumption tests were conducted to ascertain data set normality (Shapiro–Wilk test) and homogeneity of variances (Levene's test). A p-value greater than 0.05 in the Shapiro–Wilk test indicated a normal distribution, whereas p-values below 0.05 indicated a non-normal distribution (Field, 2009). Similarly, if Levene's test significance exceeded 0.05, the variances of the experimental and control groups were considered homogeneous. As all p-values in this study were above 0.05, demonstrating adherence to normality and homogeneity assumptions, parametric statistical analysis was pursued.

To quantify the improvements in reading abilities, the N-Gain Score calculation was employed, measuring the normalized gain from pre-test to post-test for the respective groups. A paired sample t-test analyzed the hypothesis regarding potential significant differences in pre-test and post-test scores within the same group (experimental or control) post-treatment. Specifically, the t-test for the experimental class assessed whether the introduction of audio storybook media resulted in significant enhancement in early reading skills, while the control class was evaluated under conventional teaching methods. The criterion for significance was set at a p-value of less than 0.05 (Field, 2009). The statistical analyses, including N-Gain and t-test, comprehensively assessed the effectiveness of the developed media in improving students' early reading skills.

RESULTS AND DISCUSSION

Results

Media Content Validation

The material expert conducted an evaluation of a digital audio storybook by focusing on two primary aspects: the quality of digital media and the content of the story. In the first round of validation, the digital media quality received an average score of 3.2, while the story content scored slightly higher at 3.4, both of which classified them as adequate, indicating that improvements were necessary. Consequently, the overall assessment deemed Moderately Feasible for trial use, coupled with suggestions for revisions drawn from the expert's feedback. The results are shown in Figure 3, which shows the average scores for each aspect of the material that was assessed by the material validators in the first and second stages of validation.

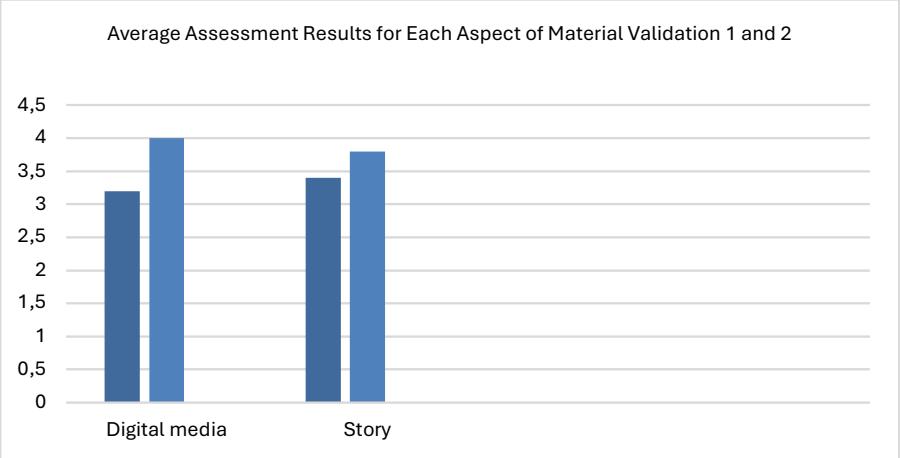

Figure 3. Material validation average results diagram

After the necessary revisions were implemented, a second round of evaluations was carried out. In this subsequent review, all assessed aspects showed notable improvements: the digital media average score increased to 4.0, and the story content achieved an average score of 3.8, both classified under the category, meaning feasible for use. The aggregate average score of 3.8 signifies that the digital audio storybook is now suited for teaching early reading to Grade I students. This marked enhancement illustrates the effectiveness of the revisions made following expert recommendations, leading to better quality across content, language, and presentation elements. The comparison of scores from the first to the second validation highlights a significant transition from an "adequate" to a "feasible" classification, which is also visualized in the validation diagrams provided in the original study.

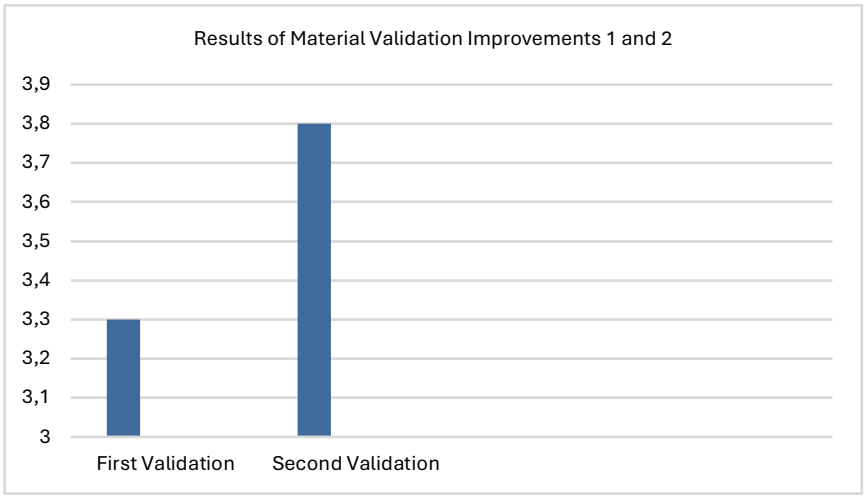

Figure 4. Diagram of Material Validation Assessment Results

Media Design Validation

The media expert validated the product's technical and design aspects in two rounds of evaluation. In the first round, all categories software engineering, instructional design, and visual communication scored 4.0, categorized as feasible, indicating they met feasibility criteria, with only minor improvement suggestions.

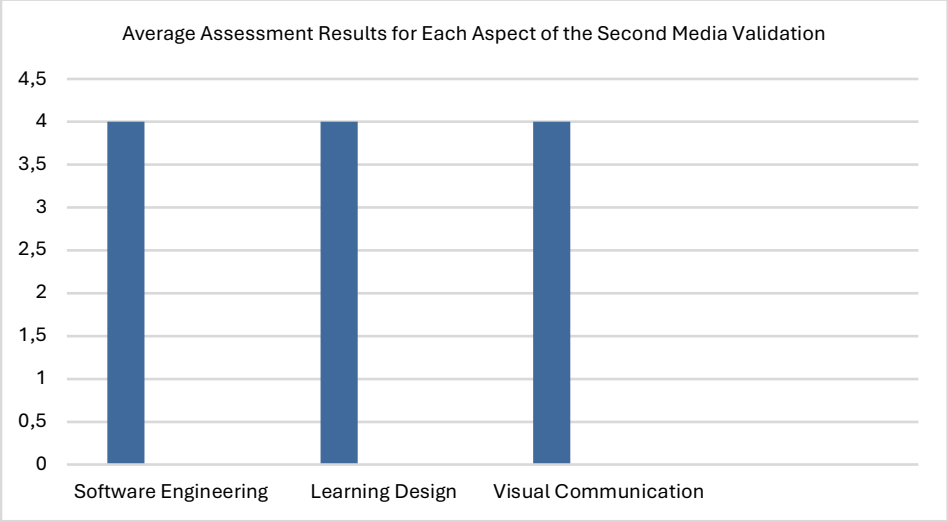

Figure 5. Diagram of average media expert validation results

After minor revisions, the second validation showed no change in scores all aspects remained at 4.0, confirming the product's readiness for classroom use without further modification. The software engineering aspect improved from an initial score of 3.8 to 4.0 in the final validation, leading to uniform feasibility across all evaluated aspects. This score stability suggests a well-designed product, ready for implementation. The average results of the first and second stages of validation by media experts can be seen in detail in the Figure 6.

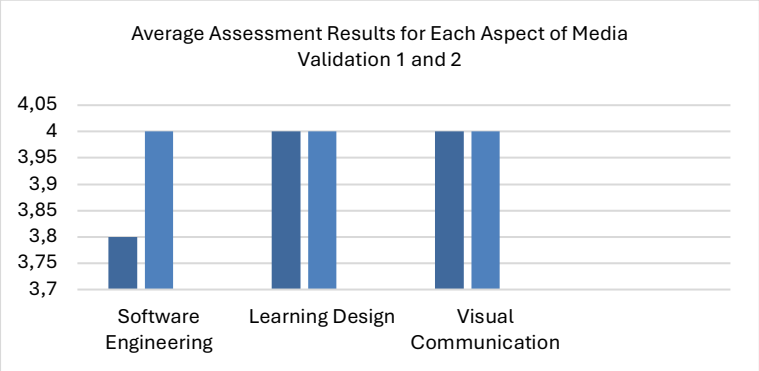

Figure 6. Media validation average results diagram

The first stage of validation, the Software Engineering aspect received an average score of 3.8, while the Learning Design and Visual Communication aspects each received a score of 4.0, all of which were categorized as "Suitable." The audio story book media was declared suitable for testing with several improvements based on the validator's input. After improvements in the second stage, all aspects still received a score of 4.0 in the "Suitable" category, indicating that the media has met the suitability standards and is ready for use. Media expert validation was conducted twice and showed consistent results at the same level of suitability.

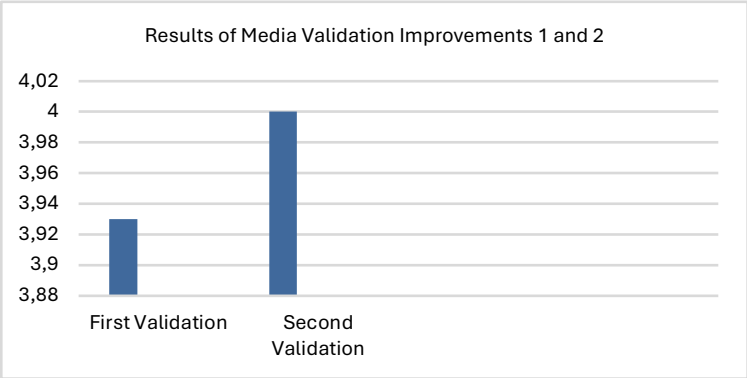

Figure 7. Media validation assessment results diagram

In the first stage, all aspects were declared "Suitable," but the Software Engineering aspect received an average score of 3.93, requiring revision according to the validator's input. The Learning Design and Visual Communication aspects each received a score of 4.0 without significant revision. After improvements, the second stage of validation showed that all aspects, including Software Engineering, received a score of 4.0 with a "Suitable" rating. These results indicate that the audio story book media has met the suitability standards and is ready for testing.

Instrument Validity

The early reading skills exam, the research tool, was validated in addition to the media. The Pearson product-moment correlation was used to assess the validity of a total of fifteen test items (ten matching tasks and five short essay items). Every item had an r-count higher than the r-table value (r-table = 0.514 for N = 15, α = 5%), according to the results. For instance, r = 0.928 for items X1 and X2, r = 0.695 for item X3, and r = 0.880 for item X15, all of which had $p < 0.01$. Each and every test item was deemed valid since r-count > r-table. The instrument accurately assesses students' reading proficiency because of the high correlation coefficients, which show a significant relationship between each item and the overall test score. As a result, the tool was accepted for use in assessing student performance.

Table 1. Instrument validation

No	Question Code	Calculated r	Validity Description
1	X1	0.928**	Valid
2	X2	0.928**	
3	X3	0.695**	
4	X4	0.710**	
5	X5	0.713**	
6	X6	0.731**	
7	X7	0.928**	
8	X8	0.928**	
9	X9	0.928**	
10	X10	0.649**	
11	X11	0.971**	
12	X12	0.924**	
13	X13	0.809**	
14	X14	0.837**	
15	X15	0.880	

Additionally, the research instrument used to assess early reading skills, composed of 15 items 10 matching and 5 short essay questions was validated using the Pearson product-moment correlation. Each item had an r-count exceeding the r-table value of 0.514 (for N = 15, α = 5%), with coefficients ranging from 0.695 to 0.928 for individual items, all significant at $p < 0.01$. This strong correlation indicates that all test items reliably measure students' reading abilities, confirming the instrument's validity for evaluating student performance.

Teacher Responses

The practicality of the digital audio storybook was assessed through teacher questionnaires after using the media in class. Table 4 of the study shows that three teachers provided feedback, with a total combined score of 170 out of a maximum of 180. This corresponds to an average percentage score of 94.44%, which falls in the Very Good category of practicality.

Table 2. Teacher response questionnaire results

No	Respondent	Score	Maximum Score	Percentage	Criteria
1	Teacher 1	57	60	95.00	Very Good
2	Teacher 2	55	60	91.67	Very Good
3	Teacher 3	58	60	96.67	Very Good
	Total	170	Average	94.44	Very Good

According to the four-scale qualitative criteria used, a “Very Good” rating indicates the product is extremely well-received in terms of ease of use and appropriateness. In other words, the teachers found the digital storybook media to be highly practical and usable in the classroom. With such a high percentage, the media is considered feasible/appropriate to be used as a teaching tool for early reading. Teachers noted that the media was easy to operate and integrate into lessons, and it facilitated their teaching process. The practicality of the digital audio storybook was assessed through teacher questionnaires after using the media in class. Table 3 of the study shows that three teachers provided feedback, with a total combined score of 170 out of a maximum of 180. This corresponds to an average percentage score of 94.44%, which falls in the Very Good category of practicality.

Student Responses

In the one-to-one trial with 3 students, the students’ responses to the media were very positive. The total score from the three students’ questionnaires was 109 out of 120, which translates to an average of 90.83% in the Very Good category.

Table 3. Results of the student response questionnaire for the individual trial

No	Respondent	Score	Maximum Score	Percentage	Criteria
1	Student 1	38	40	95	Very Good
2	Student 2	35	40	87.5	Very Good
3	Student 3	36	40	90	Very Good
	Total	109	Average	90.83	Very Good

This indicates that individually, students found the media highly appealing and easy to use. it can be seen that the assessment results conducted by three students obtained a total score of 109 with an average of 90.83%. Based on the guidelines for converting quantitative data to qualitative data using a four-point scale, the digital media product of the audio storybook falls into the "very good" category and is declared suitable for use as a learning medium to improve students' early reading skills.

Table 4. Results of the student response questionnaire for the individual trial

No	Respondent	Score	Maximum Score	Percentage	Criteria
1	Student 1	38	40	95	Very Good
2	Student 2	35	40	87.5	Very Good
3	Student 3	36	40	90	Very Good
	Total	109	Average	90.83	Very Good

This consistently high rating across a larger group of students suggests that the media is not only effective on an individual level but also in a group learning context. it can be seen that

the assessment results conducted by 9 students obtained a total score of 338 with an average of 93.88%. Based on the guidelines for converting quantitative data to qualitative data using a four-point scale, the digital media product of the audio storybook falls into the "very good" category and is deemed suitable for use as a learning medium to improve students' early reading skills.

Table 5. Student response questionnaire results from the field test

No	Respondents	Score	Maximum Score	Percentage (%)	Criteria
1	Student 1	40	40	100	Very Good
2	Student 2	39	40	97.5	Very Good
3	Student 3	38	40	95	Very Good
4	Students 4	35	40	87.5	Very Good
5	Students 5	40	40	100	Very Good
6	Students 6	35	40	87.5	Very Good
7	Students 7	26	40	65	Good
8	Students 8	40	40	100	Very Good
9	Students 9	38	40	95	Very Good
10	Students 10	34	40	85	Very Good
11	Students 11	40	40	100	Very Good
12	Students 12	37	40	92.5	Very Good
13	Student 13	40	40	100	Very Good
14	Students 14	28	40	70	Good
15	Students 15	36	40	90	Very Good
16	Student 16	40	40	100	Very Good
17	Students 17	32	40	80	Very Good
18	Students 18	40	40	100	Very Good
19	Students 19	33	40	82.5	Very Good
20	Students 20	40	40	100	Very Good
Total		731	Average	91.375	Very Good

This shows that even when implemented in a real class with many students, the digital audio storybook media maintained a very positive reception. It can be seen that the assessment results obtained by 20 students scored a total of 731 with an average of 91.375%. Based on the guidelines for converting quantitative data to qualitative data using a four-point scale, the digital media product, the audio story book, falls into the "very good" category and is deemed suitable for use as a learning medium. Students enjoyed the media and found it beneficial to their learning. The field trial results confirm that the media is highly practical on a broader scale, and that it can be effectively used by teachers and students in a normal classroom environment without issues. Across all stages (individual, small group, and whole class), the media consistently achieved “Very Good” practicality, indicating strong usability and attractiveness.

Effectiveness

After confirming that the media was feasible and practical, the study examined whether it was effective in improving students’ early reading skills. The core measure of effectiveness was the improvement in reading ability from before to after using the media, compared between the experimental class (which used the storybook) and the control class (which did not). Pre-test and Post-test Scores: In the implementation phase, the experimental class (using the digital storybook) and the control class (traditional teaching) were given a reading skill test before and after the intervention. The average scores are summarized in Table 6. The experimental class had a pre-test average of about 55.7 and a post-test average of 91.8, reflecting a substantial improvement. In contrast, the control class had a pre-test average of 55.0 and a post-test average of 60.5, showing only a slight increase.

Table 6. Average score for early reading ability

Variable	Average
Pre-test Control	55
Post-test Control	60
Experimental *Pre-test*	55.7
Experimental *post-test*	91.8

These results demonstrate that the increase in early reading ability was much more pronounced in the experimental class than in the control class. The experimental group's mean gain of roughly 36 points far exceeded the control group's gain of about 5.5 points. Figure 6 in the original article illustrated this difference, confirming that the use of the digital audio storybook had a positive effect on students' reading performance, whereas the control group's improvement was minimal.

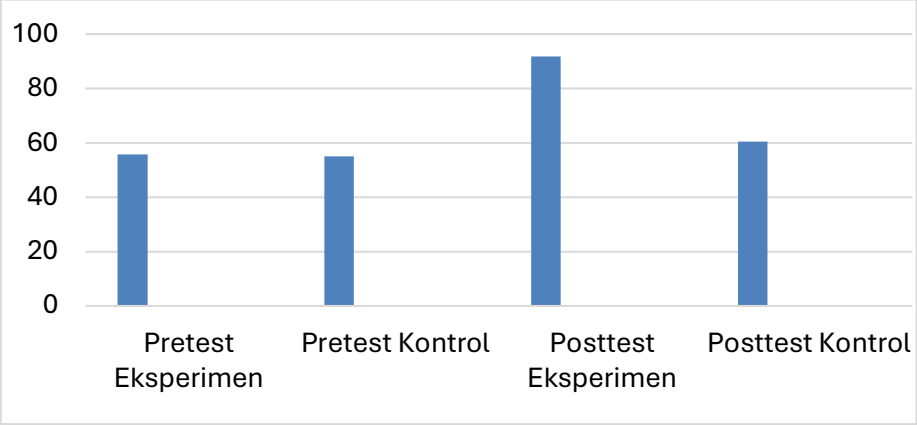

Figure 8. Comparison of the results of the calculation of the average score for beginning reading ability

The figure above shows an increase in the average pre-test and post-test scores for early reading skills in both classes. However, the increase in scores in the experimental class was more significant than in the control class, indicating that the use of digital audio storybook media had a positive effect on improving students' early reading skills.

An effectiveness test was conducted to assess the extent to which digital audio story books can improve students' early reading skills. This study used a quasi-experimental method with a nonequivalent control group design, comparing control and experimental classes. Improvements in reading skills were measured through pre-tests and post-tests in both groups, then analyzed using N-Gain Score to see the change in scores.

Table 7. Normality test results

No.	Data	Kolmogorov-Smirnov	df	Sig.	Shapiro-Wilk	df	Sig.
1	PreEks	0.121	18	0.200*	0.972	18	0.841
2	PreKon	0.131	18	0.200*	0.947	18	0.383
3	PostEks	0.153	18	0.200*	0.939	18	0.274
4	PostKon	0.145	18	0.200*	0.944	18	0.344

Based on the results of the One Sample Shapiro-Wilk test, the significance values for PreEks (0.841), PreKon (0.383), PostEks (0.274), and PostKon (0.344) are all greater than $\alpha = 0.05$. This indicates that the data are normally distributed, so that both *the pre-test* and *post-test* in the control and experimental groups meet the assumption of normality. Thus, the data are suitable for analysis using parametric statistical methods such as the t-test or gain score analysis to evaluate the effectiveness of digital audio story books on students' early reading skills.

Table 8. Homogeneity test

	Levene Statistic	df1	df2	Sig
Initial Reading Results				
Based on Mean	1.923	3	78	0.133
Based on Median	1,867	3	78	0.142
Based on Median and with adjusted df	1.867	3	74.243	0.143
Based on trimmed mean	1,922	3	78	0.133

Based on the results of *the Levene Test for Equality of Variances* on *the Initial Reading Results* variable, a Sig. (p-value) value of 0.133 (p > 0.05) was obtained for Based on Mean. These results indicate that the variance between data groups is homogeneous, or there is no significant difference in variance. N-Gain Score to quantify the effectiveness, the normalized gain (N-Gain) was calculated for each group. The N-Gain score represents the percentage of improvement relative to the maximum possible improvement. The control class had an average N-Gain of only 10.80% (with individual student gains ranging from –27.03% to +47.37%, standard deviation 20.62), indicating that on average there was very little improvement in the control group and some students even scored lower on the post-test than the pre-test.

Table 9. N-gain test results

	N	Minimum	Maximum	Mean	Std. Deviation
N-Gain Control (%)	18	-27.03	47.37	10.80	20.62
N-Gain Experiment (%)	23	57.50	100.00	80.75	12.55
Valid N (listwise)	18				

In contrast, the experimental class achieved an average N-Gain of 80.75% (with a range from 57.5% to 100%, standard deviation 12.55). An N-Gain of 80.75% is exceptionally high, falling into the category (moderate to high improvement). According to common interpretations of N-Gain, this would be considered a large gain, meaning the students learned a significant portion of what they did not know before. The stark difference between the experimental group's average N-Gain (~80.75%) and the control's (~10.8%) clearly shows that learning with the digital audio storybook was far more effective than conventional methods. The data suggest that the media greatly accelerated students' acquisition of early reading skills.

Statistical Significance (t-test): To confirm that the improvement in the experimental class was statistically significant (and not due to chance), a paired sample *t*-test was performed on the pre-test and post-test scores of the experimental group. The *t*-test results (Table 11) showed a mean difference of –35.304 (the negative sign indicating post-test scores were higher than pre-test), with a t-value = –18.045, degrees of freedom (df) = 22, and a Sig. (2-tailed) = 0.000.

Table 10. T-test results

		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-test - Post-test	-35.304	9,383	1,956	-39,362	-31,247	-18,045	22	0.000

Since the *p*-value 0.000 is less than 0.05, this indicates a statistically significant difference between the pre-test and post-test scores in the experimental class. In simpler terms, the increase in the students' reading scores after using the media is statistically significant. Thus, we can conclude that the digital audio storybook media significantly improved the students' early reading skills. For the control class, although not explicitly detailed here, their much smaller gain would not be statistically significant, reinforcing that the significant gains are attributable to the media intervention. These results align with the effectiveness criteria set out for the study,

demonstrating that the developed digital storybook is effective as a learning medium for early reading.

Discussion

Media Development and Feasibility

The ADDIE paradigm (Analysis, Design, Development, Implementation, Evaluation), which was selected for its methodical and adaptable character, served as the foundation for the creation of the digital audio storybook medium for enhancing early reading abilities (Branch, 2009). The demands for early reading education were determined during the analysis phase, which served as the foundation for creating a literacy tool for young students. Considering the cognitive developmental traits of young children (in line with Piaget's theory), the study showed that Grade I pupils need media that is captivating, interactive, and able to boost desire to read (Armbruster et al., 2001). The requirement for an audio-visual storybook method that could engage students and help them learn at the concrete operational level was therefore justified.

According to the concepts of visual-auditory learning, the design phase focused on integrating audio with interactive narration and graphical storytelling (Mayer, 2009). The goal of combining spoken tales with pictures was to teach early reading fundamentals by using both visual and auditory channels.

The media was produced and validated iteratively throughout the development period. The storybook's technical quality and content correctness were guaranteed by the two rounds of professional review. Revisions were made after the first validation revealed certain flaws with or sufficient ratings, which resulted in higher results in the second validation (average 3.8 for content and 4.0 for media, classified as Feasible. A product may be deemed a well-developed educational product if it satisfies the requirements of validity (feasibility) and practicality in expert opinion, according to Nieveen (1999). In our instance, the medium met those requirements and was deemed suitable for use by the second validation. By the last round, all of the media expert's assessments (software, instructional design, and visual communication) were signifying a media tool that was developed with reliability.

The results of the field trials for the Implementation phase were overwhelmingly positive: pupils' reading skills significantly improved, and instructors thought the medium was viable. The results of Hashemi and Azizinezhad (2012) and Sung et al. (2016), who found that audio-visual media may boost student motivation and comprehension in learning, are consistent with these discoveries. In a similar vein, Arsyad, (2019) said that media created with students' qualities in mind might hasten the accomplishment of learning goals. Our findings support these theories as the kids' engagement was improved and their reading abilities were probably acquired more quickly thanks to the interactive, age-appropriate, and engaging digital audio storybook. By the evaluation stage, summative assessments (statistical testing of learning outcomes) and formative assessments (expert comments, trial observations) had been carried out. The findings of Pujiastuti, et al. (2020) and Syawaludin et al. (2019) that interactive digital media are useful in improving students' comprehension and reasoning skills were corroborated by the statistical results, which demonstrated a considerable improvement in early reading skills. In conclusion, the digital audio storybook medium was determined to be practical and successful for providing early reading instruction that is interesting, interactive, and in line with contemporary learning concepts via the ADDIE development processes and thorough assessment.

Efficacy of the Digital Audio Storybook in Teaching Early Reading

Using the digital audio storybook medium had a significant favorable influence on kids' early reading abilities, as the operational testing (application in the classroom) clearly showed. Compared to the control group, the experimental group that utilized the media improved noticeably more. The impact magnitude of the intervention is shown by the high N-Gain score in the experimental group (≈80.75%) compared to the very low N-Gain in the control group (≈10.8%). This significant disparity shows that the media offered a useful learning scaffold that

the conventional method lacked. The findings of the t-test ($p = 0.000 < 0.05$) showed a significant difference in learning gains favoring the group that used the interactive storybook, which further supported the usefulness of the medium.

These results support earlier research that highlights how creative, interactive media may significantly improve students' literacy and cognitive abilities. For example, Pujiastuti, et al. (2020) discovered that audio-visual materials enhance students' comprehension and retention of information. Reading and other fundamental cognitive abilities are positively impacted by interactive digital media, according to Syawaludin, et al. (2019). The digital storybook in our research enabled students to actively participate in reading by listening to stories while following text and illustrations, which probably improved their comprehension and decoding abilities. Traditional teaching approaches may not provide this active involvement, which is essential at the early reading stage. The experimental class's notable increase indicates that the media improved pupils' ability to read words properly, identify letters and words more accurately, and engage in active learning. This is in line with Adipat (2024), who emphasized the value of cutting-edge media in producing worthwhile educational opportunities. Furthermore, studies by Yu, et al. (2024) and Ananda et al. (2023) provide evidence that interactive media may effectively foster students' reasoning and critical thinking abilities. Our findings add to this body of research by demonstrating a measurable increase in reading, a foundational ability, when a digital interactive medium is used.

In summary, the digital audio storybook medium shown efficacy in bolstering early reading abilities while also delivering an engaging, interactive, and significant educational experience for pupils. This implies that by offering a multisensory learning resource that engages young students and supports their developing literacy, well-designed digital storybooks could be incorporated into early reading curricula to address some of the common issues (such as low motivation and trouble connecting text to meaning).

CONCLUSION

The following conclusions may be made in light of the research and development process that was conducted an examination of the requirements of instructors and students in Grade I early reading teaching served as the basis for the creation of the digital audio storybook medium. Using both visual and aural components, the medium was created as a learning tool through the ADDIE phases, combining audio narration with graphical storytelling. Teachers and students responded favourably to the digital audio storybook medium after it was assessed for viability by media and material specialists. The medium received an average score of around 3.3 for content elements and 3.93 for media/technical factors during the first validation stage, earning it the rating Moderately Feasible. The media was classified as Feasible for use in early reading teaching in Grade I primary school after changes were made in response to the validators' recommendations. The second validation stage scores rose to an average of 3.8 for content and 4.0 for media.

Teachers and students considered the digital audio storybook medium to be very useful. The results of the practicality tests demonstrate this: both instructors and students stated that using the media to educate was simple and fun. Student answer averages were 90.83% (individual trial), 93.89% (small group trial), and 91.38% (field trial), all of which fell into the Very Good category. The instructor response questionnaire produced an average of 94.44% in this category. These findings suggest that the medium is interesting, easy to use, and appropriate for use in early reading instruction in the classroom. Students' early reading abilities were successfully enhanced by the digital audio storybook materials. An average N-Gain of 80.75%, which falls into the high category of improvement, indicated that pupils in the experimental class had significantly improved their reading abilities. The media-free control group, on the other hand, had little improvements. Additionally, the experimental class's pre-test and post-test scores differed significantly, as shown by the results of the t-test (Paired Sample t-Test), which had a p-value of 0.000 ($p < 0.05$). This suggests that the experimental group's improvement was

statistically significant. For this reason, the digital audio storybook medium significantly improves pupils' early reading abilities.

All of the aforementioned arguments lend credence to the general conclusion that the created digital audio storybook is a workable, useful, and efficient teaching tool for elementary school students starting to read. The medium has been found to enhance reading results for Grade I pupils and meets the demands of early readers by offering an engaging and participatory method of combining text and audio. A useful tactic in early literacy teaching to promote improved reading abilities and increased student engagement is the use of digital storybook material.

ACKNOWLEDGEMENT

The researchers express their sincere gratitude to all parties who supported the research entitled "Development of Digital Audio Story Book Media to Improve the Beginning Reading Skills of First Grade Elementary School Students in the Trimulyo Kapanewon Sleman Cluster." Special appreciation is extended to the Directorate General of Higher Education, Research, and Technology and Yogyakarta State University for the facilities and academic support; the Elementary School Teacher Education Study Program and supervisor Mr. Herwin for guidance and motivation; the Sleman Regency Education Office and Trimulyo Cluster for granting research permission; as well as the principals, first-grade teachers, and students of the participating schools for their cooperation and feedback. The researchers also thank all individuals who contributed morally and materially. May Allah SWT reward all forms of assistance, and may this research contribute positively to the development of learning media and early reading skills in elementary schools.

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