

INTERACTIVE FLIPBOOK-BASED DIGITAL STORYBOOKS TO INTRODUCE PERSONAL ORAL HYGIENE FOR YOUNG CHILDREN

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ABSTRACT

This study aims to evaluate the effectiveness of digital storybooks in promoting personal hygiene and toothbrushing among young children. This study employs the research and development (R&D) method. It follows the ADDIE development model, which includes five key stages: analysis, design, development, implementation, and evaluation. This product was created using the Canva and Flipbook applications. The product has been assessed for suitability by media and material experts. This research also involved assessments by five teachers, and to test its effectiveness, the product was tested on five sample students at Khalifah Al-Qolam Kindergarten. Data was collected through questionnaires and observations. The data obtained was analyzed using a quantitative descriptive approach. The research results indicate that the digital storybook learning media is feasible, with a 95% approval rate from subject matter experts and an 85% approval rate from media experts. The teacher response test yielded a 68% approval rate, and the student trial test yielded a 92% approval rate, thereby confirming the product's feasibility and effectiveness for use. Thus, this digital storybook can introduce young children to personal hygiene practices, such as brushing their teeth.

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1. INTRODUCTION

Information and communication technology (ICT) plays a crucial role, especially in education (Kim, 2020). Technology is now integral to learning (Watini, 2022). Digital books with relevant content are among the tools used. Digital books have proven effective in implementation and in enhancing the quality of learning environments (Fitri, 2020). Rapid

advancements in this field have greatly impacted education. In education, digital technology functions as a system that supports active learning, knowledge building, research, and exploration. It also enables communication and data exchange between teachers and students, even across different classrooms (Roemintoyo & Budiarto, 2021). Thus, this technology is not just an information tool, but broadens educational applications across classrooms, schools, and other learning centers (Rizkiyah, 2022).

Digital books, or e-books, are technological media that use computers to present information (Roemintoyo & Budiarto, 2021). They do this using text, images, audio, and other media in a concise and dynamic way. This content can be accessed by computers or other electronic devices (Rajagukguk et al., 2021). Digital books have images or sounds that children can play with a single touch on the screen or by clicking on the keyboard. This gives them a different learning experience when reading. Digital books with real images are considered the best tool for learning to read, especially for comprehension. This is because real images help children better understand the meaning of the text (Islamiya & Oktavianingsih, 2024). The images make it easier for them to understand the text and real-world situations (Purnamasari et al., 2024). Digital books not only develop children's reading skills but also support other aspects of early childhood language. By using digital books, children can learn how to read and practice repeatedly. The more often they see the text, the easier it is for them to quickly identify and pronounce words. As a result, they will learn reading fluency skills faster. (Ruddamayanti, 2019).

Picture books are an effective way to teach moral messages, character building, and independence to children (Mufidah et al., 2018). Furthermore, research findings show that their simple stories, engaging illustrations, and age-appropriate language help teachers and parents instill good habits from an early age (Amril & Pransiska, 2021). Picture books are also widely used in health education, including those related to clean and healthy living, particularly personal hygiene (Hadiwibowo, 2016; Pramudita & Linggardini, 2023).

Personal hygiene refers to the practice of maintaining cleanliness to prevent disease and promote overall health. One important aspect of personal hygiene that should be introduced early is dental and oral care. Developing the habit of brushing teeth regularly can help prevent tooth decay, which is among the most common health problems in children. Data from the 2018 Basic Health Research (Kemenkes, 2018) indicate that 93% of Indonesian children experience dental problems, particularly cavities, which may lead to pain, eating difficulties, sleep disturbances, and concentration issues during learning. The findings show that it is important for parents and teachers to teach dental hygiene from an early age.

Teaching dental hygiene to young children can be done using various methods and media, such as digital storybooks. However, the use of digital storybooks is still limited in schools. Based on interviews with teachers at Khalifah Al-Qolam Kindergarten, teachers said that the limitations of media, especially digital media, were an obstacle in teaching dental hygiene to children. Teachers emphasized the importance of introducing personal hygiene, especially to young children, through media such as storybooks that can be used both at school and at home.

Based on preliminary studies and product needs analysis, the purpose of this study is to examine the effectiveness of digital storybooks in introducing personal hygiene, with a specific focus on tooth brushing, to early childhood. Therefore, the development of a flipbook-based digital storybook serves as an innovative alternative that aligns with the characteristics of today's children, who are already familiar with digital devices. This medium is designed not only to capture children's attention through interactive and visual elements but also to support educators and parents in delivering the material. The product developed in this study is an interactive digital storybook that introduces the habit of brushing teeth and is expected to enhance children's understanding of the importance of maintaining dental and oral health.

2. METHOD

This study employed a research and development (R&D) method with the aim of producing a picture storybook. The book was designed to serve as

teaching material as well as a supplementary resource to support the learning process. The R&D method is an approach intended to systematically produce and test the effectiveness of a product. This study involved experts to assess the feasibility of the developed media. In addition, teachers and children in class B (5–6 years old) at Khalifah Al-Qolam Kindergarten were included as participants to evaluate the product's feasibility.

The research developed a digital-based storybook to promoting personal hygiene and toothbrushing among young children aged 5–6 years at Khalifah Al-Qolam Kindergarten. The study applied the ADDIE development model, which consists of five stages: analysis, design, development, implementation, and evaluation (Sugiyono, 2019). Data were collected using closed-ended questionnaires, which included three types: an expert product feasibility questionnaire, a teacher response questionnaire, and a child response questionnaire. The data were analyzed using descriptive statistical techniques. The feasibility instrument for the digital storybook was analyzed using the following formula:

Explanation:

$$P = \frac{F}{N} \times 100\%$$

- P = Percentage
- F = Frequency of values obtained
- N = Number of respondents

The feasibility criteria for the developed digital storybook learning media are presented in Table 1.

Table 1. Feasibility Criteria

Criteria	Percentage
Very Feasible	76%-100%
Feasible	51%-75%
Sufficiently Feasible	26%-50%
Not Feasible	0%-25%

The product is considered feasible for use if it receives a score between 51% and 100%. This indicates that the product has met the required quality and effectiveness standards to support a high-quality learning process.

3. RESULT AND DISCUSSION

This research on the development of digital storybooks applied the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. The following section presents the results of the storybook development based on these stages.

The first stage is **analysis**, in which the researcher identified the need for educational media to introduce personal hygiene habits, particularly toothbrushing, to young children (ages 3–6). According to the 2018 Riskesdas data, only about 42.5% of children aged 5–9 brush their teeth twice a day as recommended (Kemenkes, 2018)

The second stage is **design**, where the planning and creation of the educational media took place. Based on the results of the needs analysis, the researcher selected a digital storybook as the most suitable medium. The storybook was designed using the Canva (as shown in Figure 1).



Figure 1. *Platform Canva*

Images created using Canva are then uploaded to the Hyzine app (as shown in Figure 2) to be turned into flipbooks. This is intended to make it easier for readers and allow for wider access.. The content features a “candy monster” that emphasizes the importance of sharing and maintaining dental health. The story includes three main characters: Azril, Kevin, and Zilan.



Gambar 2 *Platform Heyzine*

The third stage is **development**, which involves creating the digital storybook and obtaining assessments from subject-matter experts and media experts. The platforms used in the development process were Canva and Heyzine. The researcher utilized Canva to design the storybook using elements available in the application, and then uploaded it to Heyzine to be converted into a digital book format (as shown in figure 3).



Figure 3. Final Result

After the digital storybook was created, it was validated by subject-matter experts and media experts. The results of the subject-matter experts' assessment regarding the suitability of the digital storybook are presented in Table 2.

Table 2. Content Suitability and Cognitive Aspects

No.	Indicator	Score
Content Suitability Aspects		
1.	The alignment of storybook illustrations with the characteristics of children aged 5–6 years.	4
2.	The alignment of the digital storybook content with the developmental characteristics of children aged 5–6 years.	3
3.	The extent to which the content of the digital storybook fosters children's interest in using educational materials.	4
Cognitive Aspects		
4.	Knowledge about sharing is presented in a way that is easy to understand.	4
5.	Knowledge about health is presented in a way that is easy to understand.	4
Score Obtained		19
Persentase		95%

Table 2 shows that the material experts' assessment of the digital storybook resulted in a total score of 19, with a percentage of 95%. This percentage falls into the "Very Suitable" category. Thus, according to the

material experts, the digital storybook developed in this study is considered suitable for field testing. Furthermore, the digital storybook was evaluated by media experts using a media expert questionnaire. The results of this validation are presented in Table 3.

Table 3. Media Expert Validation Results

No.	Indicator	Score
Physical Appearance		
1.	Appropriateness of the appearance of the digital storybook for children aged 5–6 years.	4
2.	Appropriateness of the digital storybook for group use (maximum of 5 children).	3
Graphic Design		
3.	Accuracy of color selection in images.	3
4.	Overall appeal of color composition.	4
5.	Suitability of images with storybook content.	3
6.	Image quality in the storybook.	3
7.	Readability of titles in the storybook.	4
8.	Accuracy of font selection.	3
9.	Attractiveness of the storybook content design for children	3
10.	Accuracy of the layout of images with text.	3
Language		
11.	Appeal of the title for children aged 5–6 years.	4
12.	Use of communicative language.	3
Score Obtained		44
Persentation		85%

Table 3 shows that the overall score for the media feasibility assessment was 44, with a percentage of 85%. This percentage falls into the “Highly Feasible” category. Therefore, according to media experts, the digital storybook developed in this study is considered feasible for testing.

The fourth stage is **implementation**. After the digital storybook was declared valid and feasible by both subject-matter experts and media experts, it was tested on teachers and children to determine their responses to the product. The results of the teacher response questionnaire regarding the digital storybook are presented in Table 4.

Table 4. Teacher Response Questionnaire Results

No.	Indicator	Teacher 1	Teacher 2	Teacher 3	Teacher 4	Teacher 5
1.	Appropriateness of material for early childhood characteristics	3	3	2	3	2
2.	Ease of use	3	3	2	3	2
3.	Usefulness of digital storybooks for introducing the concepts of sharing and health	3	3	3	3	2
4.	Attractiveness of digital storybooks	3	3	3	3	2
5.	Appropriateness of appearance for early childhood	3	3	3	3	2
Total		15	15	13	15	10
Mean		13,6				
percentage		68%				

The data in Table 4 shows that the assessment percentage for the digital storybook developed in this study is 68%. This percentage falls into the “Fairly Good” category. These results indicate that there are still limitations in the use of the product by teachers, so the researchers conducted interviews related to the obstacles experienced by teachers. The following are the results of interviews with teachers

“In its use, a strong internet connection is needed.” (Respondent 1)

“In terms of content, sentences that are inappropriate need to be avoided and adjusted to language that is easy for children to understand.”
(Respondent 2)

The teachers' responses were then used as feedback for product improvement. The revised product was then tested on children, and the results of the children's response survey can be seen in Table 5 below.

Table 5. Results of the Children's Response Questionnaire

No.	Indikator	Initial				
		DL	BN	AZ	LS	RK
1.	Attractive pictures for children	2	2	2	2	2
2.	Attractive colors	1	2	1	2	2
3.	Easy-to-understand story content	2	2	2	2	2

4.	Increases knowledge about dental health	2	1	2	2	2
5.	Fosters interest in learning	2	2	2	2	2
Total		9	9	9	10	10
Mean		9,4				
Precentage		92%				

The data in Table 5 show that the product trial through the children's response questionnaire obtained an average score of 9.4, corresponding to a percentage of 92%. This percentage falls into the "Very Acceptable" category, indicating that the product is considered appropriate for use.

The fifth stage is **evaluation**, which was conducted based on assessments from expert validators and users. The users of this digital storybook were five teachers and five kindergarteners from Khalifah Al-Qolam. The evaluation stage in this study involved a comprehensive review of the obstacles and challenges encountered during the research process, from analysis to implementation. This stage also included improvements, suggestions, and feedback from experts and teachers aimed at enhancing the quality of the product (Abdulatif & Muh. Husen Arifin, 2023). During the development stage, material expert validators provided significant input and recommendations regarding the digital storybook, which required revisions and re-editing to improve its quality.

The importance of oral health was also emphasized in this study. Oral health is often not considered a priority, yet the mouth and teeth serve as entry points for germs and bacteria that can affect the overall health of the body. Complaints about cavities remain common among both children and adults, and should not be overlooked, as they can significantly impact quality of life. Dental problems may cause pain, discomfort, disability, acute and chronic infections, difficulties in eating and sleeping, and even increase the risk of hospitalization. These conditions not only lead to high medical costs but also reduce children's learning time (Kemenkes, 2018)

Every child should be taught how to maintain oral hygiene to ensure that their dental and oral health remain in good condition. Children need to develop the habit of caring for their teeth and mouth by using age-appropriate

toothbrushes and toothpaste. In this regard, parents and teachers play a crucial role in supporting children's oral health (Rahmawati et al., 2022).

The development of digital-based educational media is an effective approach to supporting early childhood education, particularly in introducing healthy habits such as toothbrushing (Hadiwibowo, 2016). Flipbook-based digital storybooks are designed to present personal hygiene material in an engaging, interactive, and age-appropriate manner, aligned with the cognitive development stage of early childhood. This medium leverages visual elements, storytelling, and narration to help children understand the importance of maintaining oral hygiene.

According to Piaget, children aged 5–6 years are in the preoperational stage, where they learn more effectively through visual representations and concrete experiences. Based on this, visuals in digital storybooks can help make the abstract concept of hygiene an effective tool for introducing personal hygiene to young children through concrete experiences. As an innovative learning medium, digital storybooks not only facilitate the learning process but also provide interactive, engaging, and enjoyable learning experiences, thereby enhancing children's understanding during learning activities (Faizah et al., 2023; Setiawan et al., 2019).

Based on the validation results and responses, the flipbook-based digital storybook was deemed suitable for use as an educational medium to introduce personal hygiene, particularly toothbrushing, to young children. This medium met the standards for dental health content, incorporated interactive designs that are appealing to children, and received positive responses from end users, especially children.

4. CONCLUSION

The flipbook-based digital storybook developed in this study was evaluated for suitability by subject-matter experts and media experts, and subsequently pilot-tested with teachers and children aged 5–6 years at Khalifah Al-Qolam Kindergarten. The findings indicate that the digital storybook is appropriate for use in introducing personal hygiene, specifically toothbrushing, to children. By addressing children's needs and incorporating developmentally appropriate content, digital storybooks can serve as an effective educational tool to foster the habit of maintaining dental hygiene in

an independent and enjoyable way, aligning with the objectives of early childhood dental health education. This study used a limited number of subjects so that more extensive trials can be conducted in the future, and the product needs to be refined so that it can be more widely accessed.

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