

Design and Evaluation of Digidongeng: An Interactive Digital Storybook for Early Childhood Sexual Education

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ABSTRACT

Cases of sexual violence against young children continue to rise, underscoring the need for developmentally appropriate and engaging early childhood sexual education. This study aimed to (1) analyze teachers' needs for sexual education learning media and (2) design, develop, and conduct an initial evaluation of Digidongeng, an interactive digital storybook for children aged 5–6 years. Using a Design and Development approach with the ADDIE model, the analysis stage involved interviews with two early childhood teachers to identify content priorities, preferred media features, and implementation concerns. Based on these findings, Digidongeng was designed and developed using Book Creator with multimedia elements (narration, visuals, and interactive buttons). The product was validated by two experts (content and media) using a 4-point rubric covering presentation, relevance, usability, and safety. A limited classroom trial was then conducted with 20 kindergarten children; children's engagement, ability to operate the media, and observable comprehension were documented using observation sheets. Expert validation indicated that Digidongeng was highly feasible (98.07% for both content and media validation). In the field trial, overall feasibility reached 93.5% (374/400), with children showing high interaction and sustained interest, and teachers reporting that guided facilitation supported children's participation. Digidongeng demonstrates strong initial feasibility and acceptability as an interactive, child-friendly medium to support early childhood sexual education. Further research should examine learning outcomes with stronger evaluation designs and broader implementation across diverse settings.

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1. INTRODUCTION

The alarming increase in cases of sexual violence and harassment against children has become a global and national concern that demands urgent attention. According to UNICEF (2021), nearly 120 million girls worldwide—approximately one in ten—have experienced forced sexual acts before the age of 20. In Indonesia, the 2023 Annual Report by Komnas Perempuan recorded 2,363 cases of sexual violence involving children. These figures represent only reported cases, while many more go undocumented due to stigma, fear, and limited access to reporting mechanisms. Furthermore, data from the Child Special Protection cluster (PKA) by KPAI (2024) noted 679 complaints, with 265 involving children as victims of sexual crimes. These facts highlight children's vulnerability and the critical need for preventive and educational efforts from an early age. Sexual education—defined by Azis (2015) as guidance provided from early childhood to adulthood on bodily awareness and responsible behavior—has been identified as one of the key strategies to address this issue.

During the early years of life, children are in the formative stage of development, where safety and guidance play a central role. Implementing sexual education at this stage helps children build a sense of body autonomy, identify inappropriate behavior, and develop confidence to protect themselves. Marlina & Andriyani (2021) emphasize that young children must understand which parts of the body are private and should not be touched by others. Fatmawati and Nulpiana (as cited in Nazari, Bangsawan, Utami, & Husin, 2023) further argue that sexual education builds children's awareness of their bodies and supports their ability to defend themselves from threats. Synthesizing these perspectives, early sexual education can be viewed as an essential foundation for empowering children with the knowledge and language necessary to communicate boundaries and seek help when needed.

The importance of cultural and religious sensitivity in delivering sexual education cannot be overstated. In Muslim-majority societies such as Indonesia, integrating religious values is crucial to gaining community acceptance. Choirudin (as cited in Justicia, 2015) explains that sexual education should be designed to prevent behaviors that contradict Islamic teachings while safeguarding children from exploitation. One relevant model is the "Underwear Rules" campaign initiated by the Council of Europe, which teaches children that the parts of the body covered by underwear are private and should not be touched by others (Justicia, 2015). These principles are operationalized through five essential messages: (1) "Your body belongs to you"; (2) "Good and bad touches"; (3) "Good and bad secrets"; (4) "It is okay to say no"; and (5) "Prevention and protection are the responsibility of adults." This approach has proven effective in helping children recognize abuse and communicate discomfort.

To make these concepts accessible, engaging media is essential. Learning media is a key component in the teaching process, functioning as a bridge between educational content and young learners. Dwijayani (2019) notes that instructional media aids in delivering messages in a structured and goal-oriented way. Digital storybooks—defined by Prasetya et al. (as cited in Rizkiyah & Ningrum, 2022) as publications combining multimedia elements such as text, images, audio, and video—offer a promising medium for delivering sexual education content. Unlike printed books, which typically rely on passive read-aloud methods (Johnson, as cited in Yumnah, 2017), digital books can be interactive, personalized, and stimulating for young learners.

Digital storybooks are more than just electronic books; they offer features that enhance learning, such as animations, quizzes, and games. Permatasari & Lestari (2023) affirm that these books are not only visually appealing and cost-efficient but also adaptable for use at school and home. Supporting this, Fiputri (2022) highlights that digital books allow meaningful two-way interaction between children and content. Furthermore, Hanifah, Aeni, and Jayadinata (2023) found that the use of digital comics significantly increased students' comprehension in civic education. These findings suggest that interactive, story-based digital media can be equally effective in addressing more sensitive topics, such as sexual education.

Despite this potential, the availability of interactive digital books specifically designed for early childhood sexual education remains limited. Most existing materials are still in print format and do not take full advantage of digital technology. Therefore, it is necessary to design media that is not only informative and culturally appropriate but also engaging and developmentally suitable. This study

aims to fill this gap by developing an interactive digital storybook using the Book Creator application. This platform enables the integration of multimedia elements—text, sound, images, and video—and supports other tools such as Canva, YouTube, and Bitmoji. Through this approach, the digital storybook is expected to become an effective tool for delivering early childhood sexual education in both formal and informal learning environments.

2. METHODS

2.1 Design and Research Model

This study adopted the Design and Development (D&D) research method, which serves to systematically identify and solve problems in the educational field through structured processes of design, development, and evaluation by Instructional Designers. According to Ellis and Levy (as cited in Aeni, 2019), the D&D method consists of six main procedures: problem identification, objective formulation, design and development, product testing, evaluation of trial results, and communication of outcomes.

The specific research model applied in this study is ADDIE, which stands for Analysis, Design, Development, Implementation, and Evaluation (Sugiyono, 2015), as illustrated in the following figure:

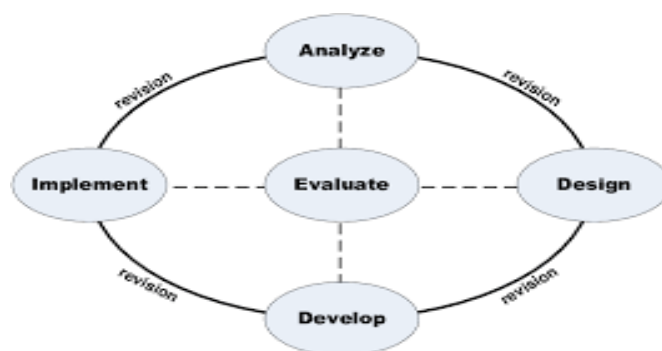


Figure 1. Product Development Stages Based on the ADDIE Model (adapted from Sugiyono, 2015)

2.2 Participant and Setting

The needs analysis was conducted at Happy Hive Preschool & Playschool, Malaysia, involving two teachers with more than 3.5 years of teaching experience. This stage aimed to identify the needs and preferences for learning media suitable for early childhood education. The product validation process was carried out at Universitas Pendidikan Indonesia, Purwakarta Regional Campus, involving two experts in early childhood education and digital media. Following validation, the media trial of Digidongeng was implemented at TK Plus Roudhoh Cihuni, Purwakarta. The trial aimed to assess the effectiveness and acceptability of the media in supporting sexual education for early childhood. The trial involved children aged 5-6 years.

2.3 Data Collection Tools

This study employed three data collection instruments:

- Interview guides were used during the needs analysis stage to explore early childhood educators' understanding and expectations regarding sexual education media.
- Expert validation rubrics, completed by two professionals—a media expert and a content expert—to assess the feasibility of the product based on appearance, content, usability, and safety. The assessment used a 4-point Likert scale, which was included in tabular form as an attachment.

- c. Observation sheets were used during the product trial with kindergarten students to document children's responses to the Digidongeng media, including initial interest, interaction, content comprehension, and any difficulties experienced during use.

Table 1. Suitability Aspects (Adapted from Arikunto, 2016)

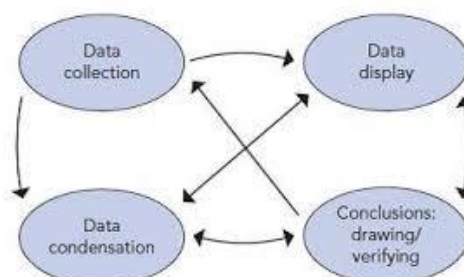
Score	Criteria	Percentage	Conversion Result
4	Very Good	$x \geq 75\%$	Highly Feasible
3	Good	$50\% \leq x \leq 74.9\%$	Feasible
2	Fair	$25\% \leq x \leq 49.9\%$	Not Feasible
1	Poor	$x \leq 24.9\%$	Highly Infeasible

2.4 Data Analysis Techniques

The interview data obtained from two early childhood educators were analyzed using descriptive analysis techniques. This involved describing the information collected to outline the needs analysis results. The data analysis technique referred to the framework of Miles and Huberman (as cited in Annisa, 2023):

- a. Data collection
- b. Data reduction
- c. Data display
- d. Conclusion drawing and verification.

This model was applied to systematically analyze interview data, observation results, and expert feedback.

**Figure 2.** Data Analysis Technique Stages According to Miles and Huberman.

2.5 Ethical Considerations

This study obtained formal approval from the participating kindergarten. The researcher was authorized to conduct data collection activities, including observations and interviews, in accordance with ethical procedures applicable to early childhood education research.

3. FINDINGS AND DISCUSSION

3.1 Findings

In recent years, greater attention has been paid to the importance of early sexual education. However, its implementation within school environments continues to face challenges. Teachers, as the primary facilitators interacting directly with children, hold varying understandings and methods for introducing this topic. To assess the needs, interviews were conducted with two early childhood educators who have teaching experience in this area. These interviews aimed to explore the teachers' comprehension of sexual education, the methods and media they currently use, the obstacles

encountered in the field, and their expectations for supportive media that can aid in delivering sexual education to young children.

3.1.1 Need Analysis

Table 2. Needs Analysis Data

Theme	Question	Respondents	
		Respondents 1	Respondents 2
Basic Understanding of Sexual Education in Early Childhood	Understanding of sexual education	Just recently heard the term and still has a limited grasp of the concept.	Has heard of it and understands that it is important for children
	Definition of sexual education for young children	Sexual education involves identity, understanding the body, emotions, and healthy relationships. Accurate, age-appropriate information is essential	Teaches the function of the body and differentiates between good and bad touches. Children often confuse the two and must be taught about safe and unsafe touches.
Strategies and Methods for Introducing Sexual Education	How to introduce sexual education to children	Conversations should start early so children feel comfortable asking about their bodies. Explanations must match their age	Using songs to identify body parts, explaining what may and may not be touched, and encouraging children to report uncomfortable touches
	Key topics in sexual education	Teaching that their body belongs to them and no one may touch it without permission	Body functions and boundaries
Media and Supporting Tools in Sexual Education	Media used	Uses storytelling, songs, and technology-based tools like body puzzles. Media must be engaging, colorful, and interactive	Uses animation, videos, and flashcards. Children understand better through visual media than still images or paper
	Use of digital media in sexual education	Has used YouTube, but with limitations to prevent screen addiction. Prefers interactive media involving movement	Videos help explain concepts, but there's concern over inappropriate content. Children learn better from videos than static visuals.
Teacher's Role and Need for Guidance	Need for guidance in using digital storybooks	Feels that guidance is necessary for accompanying children in using interactive digital storybooks	Also feels that teacher guidance is essential during the use of such media

The development of Digidongeng as an interactive digital storybook for early childhood sexual education was based on a comprehensive process that began with a needs analysis. Interviews conducted with two early childhood educators revealed different levels of understanding about sexual education. One educator had limited knowledge of the concept, while the other demonstrated a deeper awareness and emphasized its importance. Both educators highlighted the need for clear, age-appropriate media and the importance of teacher guidance during implementation.

3.1.2 Product Design and Development

The product validation was conducted by two experts: a media expert and a content expert. Each validator assessed the feasibility of the Digidongeng interactive digital storybook using a structured rubric based on four evaluation criteria:

- a. Content appropriateness: the alignment of material with early childhood sexual education objectives.

- b. Visual presentation: including age-appropriate illustrations, color usage, layout, and overall visual appeal.
- c. Language clarity: the suitability of language for early childhood comprehension and the clarity in conveying educational messages.
- d. Interactivity: the extent to which the media encourages active engagement through clickable elements, audio, and animated visuals.

Table 3. Validation of Digidongeng Media.

Evaluated Aspect	Score	
	Ideal Score	Actual Score
Media presentation	24	24
Content presentation	16	16
Content relevance	24	23
Usability	32	31
Safety	8	8
Total Score	104	102
Percentage	98.07%	

Table 4. Validation of Digidongeng Content.

Evaluated Aspect	Score	
	Ideal Score	Actual Score
Media presentation	12	12
Content presentation	8	8
Content relevance	12	12
Usability	16	15
Safety	4	4
Total Score	52	51
Percentage	98.07 %	

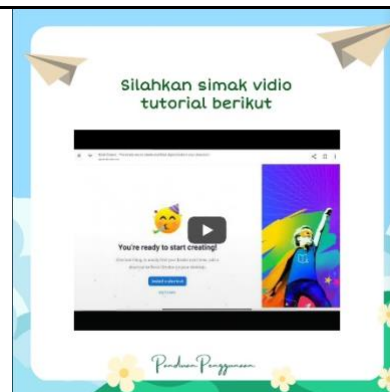
Each aspect was rated using a 4-point Likert scale, ranging from 1 (not appropriate) to 4 (very appropriate). The results showed that Digidongeng received an average feasibility score of 98.1% from the content expert and 98.3% from the media expert, both of which fall under the “highly feasible” category. In addition to scoring, the validators provided constructive feedback. The content expert recommended simplifying certain terms to enhance children’s comprehension and emphasized consistency with cultural and religious values. Meanwhile, the media expert suggested improving navigation buttons for better usability and using more expressive illustrations.

All suggestions were incorporated into the revised version of the media, including adjustments to text, navigation features, and visual elements based on the experts’ recommendations. This validation process played a crucial role in refining the product prior to its field testing with young children.

Table 5. Revisions Based on Expert Suggestions

Digidongeng Before Revision	Digidongeng After Revision
Lila's outfit selection lacked context.	Added contextual information about the event or activity
Sections lacked clear separation	
	Added divider pages for each section
Slide 13 narration lacked politeness	Added the word "please" in the illustration

No technical usage guide



Added technical guide for device specs and access

Following revisions, the product was implemented at TK Plus Roudhoh Cihuni, Purwakarta, involving 20 children aged 5–6 years. The children's responses were observed across aspects such as initial interest, interaction, media operation, content understanding, and potential difficulties. The overall feasibility score was 374 out of 400, or 93.5%, indicating strong acceptance and effectiveness.

Table 6. Feasibility Trial

Evaluated Aspect	Score	
	Ideal Score	Actual Score
Initial interest	80	71
Interaction with the media	80	78
Ability to operate the media	80	74
Content comprehension	80	79
Usage obstacles	80	72
Total Score	400	374
Percentage		93,5%

3.2 Discussion

The results indicate that Digidongeng was well-received by both teachers and students, suggesting its potential as a viable medium for early childhood sexual education. The feedback from the needs analysis aligns with prior findings by Fadilah and Muthmainah (2025), who reported inconsistent levels of preparedness among early childhood educators regarding sexual education. This underscores the importance of providing structured guidance not only for children but also for teachers, as emphasized by Rokib (2018). Both educators agreed that their role is crucial in accompanying and facilitating children's interactions with digital storybooks to ensure effective learning.

The use of interactive elements, including visuals, narration, and simple animations, supported children's comprehension and engagement. These findings support Yayi and Yuliana (2019) and Kristanto (2016), who emphasize that media which appeal to multiple senses enhance early learners' attention and retention. Moreover, children's consistent interest and interaction throughout the session suggest that Digidongeng successfully meets the developmental needs of its target users.

From a theoretical perspective, these results can be interpreted through the lens of constructivist learning theory, which posits that children construct meaning through interaction and exploration (Vygotsky, 1978). By engaging with narrative content and interactive tasks, children were not only passive recipients but active participants in their own learning. The familiar storyline, relatable characters, and responsive design allowed them to internalize the concepts of body ownership and boundaries in a meaningful way.

Furthermore, cultural sensitivity plays a key role in the success of sexual education programs. The integration of principles aligned with the Underwear Rules (Justicia, 2015) and Islamic values (Choirudin, as cited in Justicia, 2015) likely contributed to the media's positive reception. The content's

alignment with local cultural norms ensured that the material was not only educational but also respectful of the learners' social environment.

Teacher facilitation also emerged as a significant factor in the successful implementation of the media. During the trial, teachers actively guided children through each section, ensuring they understood the storyline and tasks. This finding is consistent with Rizkiyah and Ningrum (2022), who found that adult involvement significantly enhances the impact of digital media in early childhood education.

These findings contrast with earlier concerns highlighted by Marlina and Andriyani (2021) and Wulandari (2020), who reported that digital media can lead to distraction or passivity in the absence of adult supervision. The presence of teachers in this study likely mitigated those effects, supporting a more focused and enriching learning experience.

In light of the above, Digidongeng demonstrates strong potential to serve as a developmentally appropriate, culturally sensitive, and pedagogically sound tool for early sexual education. However, future studies could benefit from examining long-term learning outcomes and testing the media in more diverse educational settings.

4. CONCLUSION

The development of Digidongeng as an interactive digital storybook proved to be highly feasible and well-received, with expert validation and user trials showing strong engagement and comprehension among early childhood learners. The media offers practical benefits for educators in delivering sensitive sexual education content in a developmentally appropriate and culturally respectful manner. However, the study was limited in scope, involving a small sample and short-term observation. Future research is needed to evaluate long-term learning outcomes and explore broader implementation across diverse educational settings.

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