

Implementation of APLT Digital Media Literacy to Support Sex Education for Early Childhood

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Abstract

Sex education in early childhood is a preventive effort to foster children's understanding of body protection and privacy awareness. This study aimed to develop and examine the feasibility and effectiveness of APLT (Aku Pintar Lindungi Tubuh) digital media as a supporting tool for early childhood sex education. The study employed a Research and Development (R&D) approach using the ADDIE model (analysis, design, development, implementation, and evaluation). The effectiveness of the developed media was tested using a pre-experimental one group pretest posttest design. The results indicate that the APLT media was highly feasible, based on expert validation. Effectiveness analysis using normalized gain (N-gain) showed a moderate level of effectiveness, indicating an improvement in children's understanding of body protection concepts, including protected body parts, appropriate and inappropriate touch, and body privacy awareness. These findings suggest that APLT media is moderately effective and functions as a supportive learning resource rather than a stand alone intervention. Therefore, APLT digital media has the potential to support early childhood sex education within a limited and guided instructional context, particularly in strengthening children's initial understanding of body protection and privacy awareness.

Keywords: APLT Media; Sex Education; Early Childhood

History

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INTRODUCTION

Throughout 2024, cases of sexual violence against children in Indonesia are still a serious problem. Based on data from the Ministry of Women's Empowerment and Child Protection (KemenPPPA) (Syahfitri & Rangkuti, 2024), recorded 7,842 cases of violence against children between January and June 2024, with sexual violence representing the largest proportion of reported cases (Siswanto & Miarsa, 2024). Children, especially girls, are particularly vulnerable to this violence, and many cases occur through digital platforms. Prevention efforts continue to be made, including increasing digital resilience to protect children from online exploitation (Lewoleba & Fahrozi, 2020). Recent studies emphasize that early preventive education is one the most effective strategies to reduce children's vulnerability to sexual violence, particularly in digital environments. These conditions highlight the urgency of preventive strategies that focus on early intervention and child protection education

Sex education for early childhood is often a sensitive and complex topic. Many parents feel

worried and even hesitate to discuss this issue, considering the various social stigmas attached to the discussion of sexuality. However, in the era of the industrial revolution 4.0, children are more vulnerable to being exposed to information that is not appropriate for their age, either through social media, the internet, or the surrounding environment. Therefore, it is important to provide sex education from an early age in an appropriate and targeted manner to equip children with the right knowledge (Putri & Andriani, 2022; Suteja & Riyadi, 2019). Current research highlights that age appropriate sex education does not increase negative behavior, but instead strengthens children's awareness and self protection skills.

Sex education for early childhood does not only focus on biological aspects, but also on developing an understanding of the child's body, personal boundaries, and how to protect oneself from inappropriate behavior (Maryuni & Anggraeni, 2017). Children need to understand basic concepts such as the differences between boys and girls, and private body parts. Parents and teachers play a key role in providing appropriate sex education. Parents and teachers are the right people according to the child's level of understanding (Camelia & Nirmala, 2017; Situmorang, 2020). Through a friendly and open approach, parents and teachers can create an environment where children feel comfortable asking questions and learning about sex education (Muhimmah & Fajrin, 2022). This is where the importance of supporting media such as *Aku Pintar Lindungi Tubuh* (APLT) to help parents and teachers deliver sex education in a way that is easy for children to understand. Compared to previous approaches that rely mainly on verbal explanations, supportive learning media are considered more effective in facilitating children's comprehension of sensitive topics.

However, empirical studies indicate that the implementation of early childhood sex education remains problematic in practice. Many parents and teachers report limited confidence and pedagogical skills in delivering sex education content, particularly when addressing body protection and privacy issues. Existing learning media are often fragmented, focusing either on general moral messages or cognitive learning outcomes, without explicitly integrating body protection education and children's awareness of personal boundaries. Moreover, most digital learning media for early childhood do not adequately address the context of children's increasing exposure to digital risks, nor do they provide structured guidance for adult facilitation (Taylor et al., 2024). These limitations suggest a gap between the normative importance of early childhood sex education and the availability of empirically tested, age appropriate digital media that specifically support body protection and privacy awareness.

Media Learning is a tool that helps educators convey messages so that they are easier for children to understand and accept, and is very important in the learning process (D. Amalia et al., 2024; Moto, 2019). Media functions as an intermediary in conveying information from teachers to students, so that students are motivated and can follow the learning process meaningfully (Tafonao, 2018). The use of learning media aims to make it easier for educators to carry out the learning process (Hanannika & Sukartono, 2022). The right learning media for early childhood must meet several requirements, such

as having a simple, attractive, and safe design for children, and containing educational elements that are in accordance with the 6 aspects of child development (Suherman, 2017). Recent studies have begun to explore digital based learning media; however, most of them focus on general learning outcomes rather than sex education content for early childhood.

APLT Media is here to support sex education for young children through an interactive, informative, and fun approach. With content tailored for young children, APLT Media aims to help children understand the importance of taking care of their bodies and recognizing signs of inappropriate behavior. APLT Media also aims to empower parents and teachers with the resources they need to provide effective sex education. However, sex education for early childhood is not without its challenges. One of the main challenges is overcoming resistance from some parents who feel that this topic is too early to discuss with their children. There is also the challenge of ensuring that the information provided does not confuse or cause fear in children. Therefore, it is important for APLT media to provide information that is balanced, comprehensive, and delivered in the right way.

Early childhood sex education is a topic that has received increasing attention in recent years. However, research related to the implementation and effectiveness of early childhood sex education is still limited, especially in the context of using interactive digital media such as APLT. This study positions itself among recent research by focusing specifically on the use of interactive digital media designed for early childhood sex education, which has not been extensively examined in previous studies. The gap analysis of this study, namely APLT media, attempts to fill the gap by providing sex education materials that are tailored for children under elementary school age, so that the effectiveness of the approach through APLT media can be evaluated. The novelty of this study lies in the development and evaluation of APLT as an interactive digital medium that integrates body protection education, age appropriate content, and parental teacher involvement. The theoretical contribution of this study is to enrich the discourse on early childhood sex education through digital learning media, while the practical contribution is to provide a feasible reference for parents, teachers, and educators in implementing safe and effective sex education for young children.

Therefore, the objectives of this study are: (1) to develop APLT digital media using the ADDIE model; (2) to examine the feasibility of APLT media through expert validation; and (3) to analyze its effectiveness in improving early childhood understanding of body protection and privacy awareness. Through these objectives, this study seeks to contribute theoretically to the discourse on early childhood sex education through digital learning media and practically to provide a feasible reference for parents, teachers, and educators in implementing safe and effective sex education for young children.

METHODS

This study uses the R&D (Research and Development) research and development method to design and develop APLT (*Aku Pintar Lindungi Tubuh*) media as a means of supporting sex education

for early childhood (Earnshaw, 2018). The R&D method was chosen because it allows the development of educational products that are innovative, relevant, and in accordance with the needs of target users, namely children aged 3-4 years at the Linguma Kudus creativity school.

This research stage includes several important steps, starting from 1) needs analysis, 2) design, 3) development, 4) implementation, to 5) product evaluation.

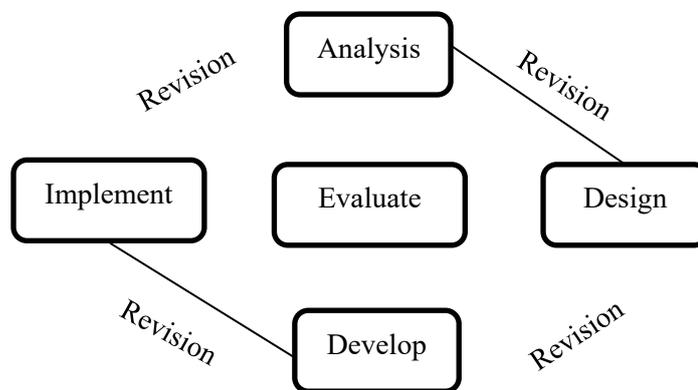


Figure 1. ADDIE concept

Source : (Branch, 2009)

In the first stage, a needs analysis was conducted to identify specific problems and needs in early childhood sex education. Data were collected through interviews, observations, and literature studies.

Next, the design stage begins by formulating the basic concept of APLT media, at this stage the media concept is designed by considering relevant content, appropriate delivery methods for early childhood, and interactive and interesting visual elements. The APLT media design must also ensure that the material delivered is safe, educational, and in accordance with the child's psychological development.

The next stage is development, where the APLT media is realized in real form. This includes content creation, development of APLT media based on power point, and initial testing to ensure that all elements work as planned. At this stage, a media prototype was developed and tested on a limited basis at the Linguma Children's Creativity School to obtain feedback.

Finally, evaluation is the final stage in the series of research and development of the ADDIE model, evaluation is conducted to assess the effectiveness of APLT media in supporting sex education for early childhood. This evaluation involves analysis of trial data, feedback from educators and parents, and measurement of the impact on children's understanding of sex education. The results of the final evaluation are the basis for improving APLT media widely.

The population of the study was early childhood at Linguma Children's Creativity School. The

research sample consisted of 11 children aged 3-4 years at Linguma Children's Creativity School. The sampling technique used was purposive sampling, given the small sample size and the involvement of only one educational institution, this study does not aim to achieve statistical generalization. Instead, the findings are intended to provide contextual insights into the feasibility and initial effectiveness of APLT media in early childhood sex education. Data collection techniques were carried out using questionnaires and observation sheets. Considering the developmental characteristics of children aged 3-4 years, learning outcomes were measured using structured observation instruments rather than written tests. The observation sheets were designed to capture observable indicators of children's understanding of sex education concepts, such as recognition of body parts that should be protected, awareness of appropriate and inappropriate touch, and understanding of personal boundaries. This observational approach is pedagogically appropriate, as young children express comprehension primarily through behavior, verbal responses, and interaction during learning activities.

Validation is done by testing the questionnaire through expert judgment. If there are question items that require revision, improvements will be made. After validation by experts is declared valid, the questionnaire is ready to be tested. Reliability testing will be carried out on the research instrument only once, and the results are analyzed using certain techniques. The instrument reliability trial was conducted on 11 children at the Linguma Children's Creativity School. The analysis of instrument reliability in this study used the alpha-Cronbach statistical test with the help of the SPSS application. The reliability coefficient in this study is in the range between zero and one. The higher the reliability coefficient that approaches one, the higher the level of reliability of the instrument. The following is a table of alpha-Cronbach reliability coefficients:

Table 1

Alpha-Cronbach Reliability Coefficient

<i>Aspect</i>	<i>Number of Items</i>	<i>Cronbach's Alpha Coefficient</i>
Cognitive Aspect	10	0.85
Affective Aspect	8	0.82
Psychomotor Aspects	7	0.88
Total	25	0.86

The reliability coefficient above shows that the instrument used has a high level of reliability, with a Cronbach's alpha coefficient value above 0.8 which is generally considered good in social research.

Data analysis techniques in the APLT media development research to support early childhood sex education use several stages, starting from needs analysis, product design, product development, to product trials and evaluation. In this study, there are two types of data used qualitative and quantitative data analysis. Qualitative information comes from input from material experts and media experts as

material for product improvement during the APLT media development process on sex education. Quantitative information comes from the assessment of material experts and media experts on the relevance of APLT media on sex education. The media feasibility analysis is calculated using a Likert scale, which has answer choices and scores (Sudjana, 2016) :

Table 2

Likert Scale Table

<i>Evaluation</i>	<i>Score</i>
Strongly Disagree	1
Don't agree	2
Agree	3
Strongly agree	4

$$P = \frac{f}{n} \times 100\%$$

Information :

P = Percentage of eligibility

f = Frequency

n = Ideal value multiplied by the number of questions

100 = Constant

To determine the quality of media eligibility, the final presentation results will be converted into assessment statements. The following table describes the eligibility criteria (Arikunto, 2018) :

Table 3

Media Criteria Eligibility Level

<i>Percentage Score</i>	<i>Interpretation</i>
81-100%	Very worthy
61-80%	Worthy
41-60%	Quite decent
21-40%	Not feasible
<21%	Totally unworthy

APLT media is declared feasible if the percentage results meet the criteria of "very feasible", which is 81-100%, as shown in the table above. In addition, quantitative data analysis includes the results of field trials aimed at determining how effective APLT media is for teaching about sex education. Children assess their abilities before and after using APLT media. The trial was conducted using a pre-experimental design of one group pre-test-post-test, which is based on the following formula:

O1 X O2

Information

- O1 = Pre-test score
 O2 = Post test score
 X = Treatment

Furthermore, since this study uses a pre-experimental design of one group pre-test and post-test, the pre-test and post-test data will be analyzed to determine the significance of increasing children's sex education knowledge. This will be done using Normalized Gain (N-gain):

$$\text{N-gain} = \frac{\text{Posttest} - \text{Pretest}}{\text{Maximum Score} - \text{Pretest}}$$

Where Posttest represents the post-intervention score, Pretest represents the pre-intervention score, and Maximum Score represents the highest possible score of the instrument. To determine the level of effectiveness of APLT media in sex education for early childhood. The N-gain value obtained is used to determine the level of effectiveness of APLT media, interpretation is carried out with the following criteria:

Table 4

Level of Effectiveness of Media Criteria

<i>Interpretation</i>	<i>N-Gain Value</i>
Low	N-gain < 0.30
Moderate	0.30 < N-gain < 0.70
High	N-gain > 0.70

APLT learning media is considered effective if the results of the criteria in the table above, namely meeting N-gain > 0.70. This study employed a pre-experimental one group pretest posttest design without a control group. Combined with the limited sample size, this design restricts causal inference and generalizability of the findings. Therefore, the effectiveness results should be interpreted as indicative and context-specific, serving as a basis for further large scale and comparative studies.

RESULTS AND DISCUSSION

RESULT

The results of the research on the development of APLT Media (Display Sheet Teaching Aids) that support sex education for early childhood are divided into several stages, namely analysis, product design, product development, implementation and evaluation. Each stage provides a significant contribution to the process of developing an appropriate and effective product. The following is an

explanation of the stages of ADDIE development:

Analyze (Analysis)

The initial stage of this research involved a needs analysis conducted through interviews with teachers, parents, and direct observation of children aged 3-4 years at Linguma Creativity School. This analysis revealed that there was an urgent need for teaching aids that help introduce basic concepts of sex education, such as recognizing body parts, gender differences, and privacy boundaries in a concrete and developmentally appropriate manner. The results of this analysis became an important basis in determining the content and design of the APLT Media to be developed, which must be simple, interactive, and interesting for children.

This is in line with the study by (Clemente-Suárez et al., 2024), which highlights the importance of using interactive media to support the cognitive development of preschool children in understanding abstract concepts more concretely. In addition, UNESCO's recommendations in the International Technical Guidance on Sexuality Education emphasize the need for a structured, age appropriate sexuality education curriculum that utilizes engaging media to ensure children can learn in a safe and enjoyable manner (Aryal et al., 2025; Gray, 2022).

Design (Product Design Planning)

Based on the results of the needs analysis, the design of APLT Media was designed. This product was designed by considering the needs of early childhood, including the use of bright colors, clear images, and simple text. APLT Media consists of sheets containing illustrations and short narratives that are easy for children to understand. This design was then validated by experts in education and child psychology to ensure that the material presented was not only in accordance with the needs of early childhood but also effective in conveying sex education messages. The validation results showed that the design of APLT Media had met the standards of eligibility in terms of pedagogical and visual aspects.

The design of the APLT Media, which incorporates bright colors, clear illustrations, and concise narratives, aligns with (Destiawati et al., 2024), who found that media featuring engaging visuals and simple content can enhance preschool children's engagement and knowledge retention. Furthermore, (Tarigan et al., 2024) emphasized that media design tailored to children's cognitive development stages helps them understand abstract concepts more effectively. Expert validation also aligns with pedagogical standards, stating that learning materials for early childhood must be accurate, contextually appropriate, and presented through child-friendly visual methods (Pratiwi & Ismail, 2023). The following is the design of the APLT media illustration:

Table 5

Description of APLT Media Features

Feature	Description
Initial Display	When APLT Media is opened, users are greeted with an initial display designed to create a friendly, engaging, and easy to navigate atmosphere for early childhood learners.
Main Menu	The main menu functions as the primary access point to various educational contents specifically designed for early childhood. Users are provided with several menu options to explore learning materials.
Navigation Buttons	APLT Media provides interactive navigation buttons that assist users in accessing and utilizing available features. A button information menu is included to help users understand the function of each button.
Learning Selection Menu	This menu presents two main learning options, namely materials and videos. Both options are designed to offer an interactive and immersive learning experience tailored to early childhood needs.
Gender Recognition Material	This section introduces children to the differences between boys and girls using simple illustrations and explanations, enabling children to understand basic gender concepts in an age appropriate manner.
Body Privacy Material	This feature provides children with knowledge about the importance of maintaining body privacy. Children learn which body parts should be protected and understand appropriate and inappropriate boundaries.
Interactive Quiz	This menu contains simple and interactive quizzes designed to assess children's understanding of the learning materials. The quizzes are presented in a game-based format to encourage learning through play.

Development (Product Development)

The product development stage involved the production of a prototype of APLT Media based on the approved design. This prototype was then tested on a small scale involving several children aged 3-4 years and teachers at Linguma creativity school. The results of the trial showed that children were interested and easily interacted with this media. They showed a better understanding of basic sex education materials, such as recognizing body parts and the concept of privacy. Measurement of the level of understanding and involvement of children was carried out through observation and questionnaires given to teachers, with the results showing a positive response to the effectiveness of APLT Media.

Validation by media experts and material experts

The media products that have been created are then validated by media experts and material experts, so that researchers can determine the feasibility of the product. The following is a table showing the results of the media and material validation scores carried out by experts:

Table 6

Media Validation Score Results

<i>Rated aspect</i>	<i>Score (f)</i>	<i>Maximum Score (n)</i>	<i>Validation Percentage</i>
Suitability of Material to Learning Objectives	4.8	5	96%
Clarity and Visual Appeal	4.7	5	94%
Effectiveness of Message Delivery	4.6	5	92%
Ease of Navigation and Use	4.9	5	98%
Media Interactivity	4.5	5	90%
Overall User Experience	4.7	5	94%
Average Validation Percentage			94%

Table 6 shows that media validation by media experts resulted in a very high percentage in various aspects assessed, with an average validation of 94%. This shows that APLT media is very adequate for use in supporting sex education for early childhood.

Table 7

Material Validation Score Results

<i>Rated aspect</i>	<i>Score (f)</i>	<i>Maximum Score (n)</i>	<i>Validation Percentage</i>
Suitability of Material Content with Learning Objectives	4.7	5	90%
Accuracy and Relevance of Information	4.8	5	92%
Clarity and Readability of Material	4.6	5	92%
Language Appropriateness to Children's Age	4.8	5	92%
Suitability of Material to Social Norms	4.7	5	90%
Completeness and Integration of Material	4.7	5	90%
Average Validation Percentage			91%

Table 7 shows that the validation of the material by material experts resulted in a very high percentage in various aspects assessed, with an average validation of 91%. This shows that the material in APLT Media is very appropriate and suitable for use in supporting sex education for early childhood.

The development stage resulted of APLT media, which was tested on a limited scale involving children aged 3–4 years and teachers at Linguma Creativity School. During this stage, children were observed to interact with the media and to respond to learning prompts related to body recognition and privacy awareness. The feasibility of the media was assessed through expert validation. Media experts assigned an average score of 94%, while material experts provided an average score of 91%, indicating that the media fulfilled criteria related to content accuracy, visual clarity, and age appropriateness. These

validation results indicate that APLT media is suitable for use as a learning support tool. The scores reflect expert appraisal of design and content quality within the development context and therefore function primarily as indicators of feasibility rather than measures of learning impact.

Quantitative Data Analysis of Trial Results

Table 8

Pre-Experimental Design Type Trial Results

One-Group pretest-posttest design

<i>No.</i>	<i>Indicator</i>	<i>Pretest (O1)</i>	<i>Posttest (O2)</i>	<i>Difference (O2-O1)</i>	<i>Information</i>
1.	Understanding self-identity	60	85	25	Significant Improvement
2.	Understanding body privacy	55	80	25	Significant Improvement
3.	Knowledge of good and bad touch	65	90	25	Significant Improvement
4.	Awareness of stranger danger	50	75	25	Significant Improvement
5.	Ability to express feelings	58	82	24	Significant Improvement

Based on table 8, it shows that the results of the APLT media trial showed a significant increase with an average pretest score of 58 and a posttest score of 82. Based on table 8, it shows that the results of the APLT media trial showed a significant increase with an average pretest score of 58 and a posttest score of 82. The pattern of score improvement was relatively consistent across indicators. This suggests that the learning activities supported children's immediate recognition and recall of the introduced concepts during guided sessions. The observed improvements represent short-term learning responses within a structured instructional setting.

The prototype development stage of the APLT Media, which was tested on children aged 3–4 years, showed an improvement in their understanding of basic sex education. This is consistent with the findings of (Amaefule et al., 2023), which demonstrated that the use of interactive educational media can enhance preschool children's understanding of fundamental concepts through enjoyable learning experiences. Furthermore, (Perez et al., 2023) emphasized that validating media effectiveness through limited trials involving observation and questionnaires is an appropriate method for assessing the feasibility and impact of educational tools on children's learning.

Implementation (Implementation)

The implementation of APLT Media in the learning process was carried out at the Linguma Kudus creativity school and was tested on 10 children aged 3-4 years which was carried out in August 2024. This media was used in interactive learning sessions in class, where teachers directed children to

understand the content presented. The results of observations during the implementation showed that this media was very helpful for teachers in conveying sensitive material such as sex education to children. Children became more active in asking questions and sharing their understanding after the learning session, indicating that APLT Media succeeded in creating a safe and enjoyable learning environment. The results of the Standard Gain for implementation obtained a score of 0.571 or 57.1% which was interpreted in the moderate category. The details of the N-gain calculation are as follows:

$$\text{Gain Standar} = \frac{82 - 85}{100 - 58} = 0,571$$

Based on the calculation results, APLT media products on sex education for children aged 3-4 years were developed effectively. This result indicates a moderate level of learning improvement during the implementation phase, reflecting the media's contribution to children's initial understanding when used with teacher guidance.

The implementation of APLT Media in early childhood learning at Sekolah Kreativitas Linguma aligns with Vygotsky's social learning theory, which emphasizes the importance of teacher-child interaction in creating scaffolding to facilitate the understanding of new concepts (Vygotsky, 1978). This is further supported by studies conducted by (Delfiana & Setyadi, 2025; Waryunah Irmawati, 2024), who found that interactive media in early childhood education can enhance children's active participation while helping teachers deliver sensitive material more effectively. Additionally, research by (Zaidah et al., 2025) and (Khalawati et al., 2025) revealed that enjoyable, visually based learning media can foster a safe learning environment, boost children's self-confidence, and encourage them to ask questions and engage in discussions more actively.

Evaluation

After implementation, a comprehensive evaluation of the effectiveness of APLT Media was conducted. This evaluation involved analyzing feedback from teachers and parents, as well as assessing children's understanding tested through questions and answers and games related to the material being studied. The evaluation results showed that this media was not only liked by children but also effective in improving their understanding of sex education. Teachers reported that children were able to remember and apply the information they learned from APLT Media in everyday situations, such as identifying body parts and understanding privacy boundaries. Several suggestions for improvement, such as adding more illustrations and using simpler language, have been accommodated in the final revision of the product.

The evaluation of the effectiveness of APLT Media, which involved teachers, parents, and assessments of children's understanding, aligns with the formative learning evaluation model that emphasizes the importance of feedback for media improvement (Sholihan, 2024). The evaluation results, which showed an increase in children's understanding, are consistent with the study by (Sidiq

et al., 2025), which affirmed that visual-based and interactive game media are effective in helping early childhood learners recall and apply concepts in their daily lives. Furthermore, (Amalia et al., 2025; F. Amalia et al., 2024) found that the involvement of teachers and parents in evaluating children's learning makes a significant contribution to the success of educational media, as they can provide direct input regarding the relevance, language, and illustrations used.

Overall, the results indicate that APLT media is feasible and functions effectively as a supportive learning resource for introducing early childhood sex education concepts, particularly body protection and privacy awareness, within a guided instructional environment.

DISCUSSION

The discussion consistently connects the research findings with relevant theories of early childhood learning and development. The identified need for concrete and visual learning media at the analysis stage aligns with cognitive development theory, which emphasizes that young children learn most effectively through tangible and visual experiences rather than abstract explanations. This explains why APLT Media, which uses visual and interactive elements, was effective in supporting children's understanding. The mechanism of internalization appears to occur through repeated exposure to visual symbols, guided explanations, and interactive quizzes embedded in APLT Media. These features allow children not only to recognize body parts and protection rules but also to construct personal meaning through active engagement. In line with constructivist theory, children are not passive recipients of information; instead, they actively organize new knowledge based on prior experiences, especially when sensitive concepts such as personal boundaries are presented in a developmentally appropriate and non-threatening manner.

The findings are explicitly compared with previous studies to strengthen their empirical relevance. The design characteristics of APLT Media are consistent with (Destiwati et al., 2024; Tarigan et al., 2024), who reported that visually engaging and cognitively appropriate media enhance preschool children's engagement and comprehension. Furthermore, the observed improvement in children's understanding after using APLT Media is comparable to the findings of (Amaefule et al., 2023), who demonstrated that interactive educational media significantly improve conceptual understanding among preschool learners. Nevertheless, unlike prior studies that focused mainly on cognitive outcomes, this study highlights the early formation of self-protective awareness, although it does not yet capture behavioral manifestations in real-life contexts, which remains a critical limitation. Compared to earlier studies that primarily used storytelling or video-based media, APLT Media offers a more comprehensive approach by integrating display visuals, navigation features, and interactive quizzes. This integration supports multimodal learning pathways, yet its effectiveness is highly dependent on adult mediation. Without appropriate guidance, there is a risk that children may only memorize rules without fully understanding their relevance to personal safety.

The effectiveness of APLT Media during the implementation stage is theoretically supported by Vygotsky's social learning theory, which highlights the role of teacher child interaction and scaffolding in learning. The moderate N-gain score indicates that learning improvement occurred through guided interaction between teachers and children, particularly when addressing sensitive topics such as sex education. Teachers functioned as key mediators who contextualized the digital content, clarified misconceptions, and created a safe emotional environment for discussion. Similarly, parental involvement although not directly measured is implicitly crucial in reinforcing messages at home, suggesting that learning outcomes may vary depending on the consistency of adult support across contexts.

This finding is in line with (Delfiana & Setyadi, 2025; Waryunah Irmawati, 2024), who emphasized the importance of interactive media in enhancing participation and teacher facilitation. At the same time, the reliance on teacher scaffolding reveals a limitation: the effectiveness of APLT Media may differ based on teachers' pedagogical competence and comfort level in delivering sex education, which was not controlled in this study. The practical implications of this study indicate that APLT Media can be used as a safe, structured, and engaging instructional tool for early childhood sex education, assisting teachers and parents in delivering sensitive material more confidently and effectively. The theoretical implications contribute to strengthening the application of the ADDIE development model and support constructivist and social learning theories within the context of early childhood sex education, particularly through digital and interactive media.

Despite the positive findings, this study has several limitations that must be acknowledged. The sample size was relatively small and limited to one educational institution, which restricts the generalizability of the results. Additionally, the duration of implementation was relatively short, preventing the measurement of long-term learning outcomes and behavioral changes. Future research is recommended to involve larger and more diverse samples, extend the implementation period, and conduct comparative studies with other types of learning media to further validate the effectiveness of APLT Media.

CONCLUSION

This study finds that APLT digital media is feasible and moderately effective as a supportive tool for sex education for children aged 3–4 years, particularly in helping them develop an initial understanding of body protection, including recognizing protected body parts, distinguishing appropriate and inappropriate touch, and understanding body privacy through interactive visuals and guided activities. The media primarily facilitates early comprehension rather than producing maximal learning gains, with its effectiveness strengthened by concrete visual representations, repeated learning experiences, and adult guidance that aligns with early childhood cognitive characteristics. The roles of teachers and parents as learning mediators are crucial in contextualizing abstract concepts related to

personal safety and privacy, highlighting the importance of guided implementation for sensitive content. However, the study is limited by its small sample size, short implementation period, and limited context, suggesting the need for future research with larger and more diverse samples, longer durations, and additional variables such as parental involvement, facilitation strategies, long-term retention, and comparative designs to strengthen generalizability and causal conclusions.

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