

ORIGINAL

## Innovating Early Childhood Sexuality Education through Animated Learning Media: A Development and Validation Study

### Innovación en la educación sexual infantil a través de medios de aprendizaje animados: un estudio de desarrollo y validación

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#### ABSTRACT

**Introduction:** the urgency of providing sexuality education during early childhood has been widely recognised; however, pedagogical approaches remain fragmented, culturally sensitive, and often neglected. Conventional teaching methods tend to rely on verbal explanations, which are limited in their ability to engage children and address issues of gender identity, body safety, and self-protection behaviours. This study responds to this gap by developing and validating an innovative animated learning medium designed for comprehensive, age-appropriate sexuality education in early childhood.

**Method:** adopting a Research and Development (R&D) design using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) framework, this study included 60 kindergarten children aged 5-6 years and 12 teachers from Indonesia. Expert validations, teacher evaluations, classroom observations, and focus group discussions were conducted to assess the validity, practicality, and effectiveness of the medium.

**Results:** the animated video received strong validation scores (80-96,47 %), high practicality (81,44-92 %), and excellent effectiveness (86,31-92,10 %). Children showed measurable progress in recognising gender identity, understanding social roles, and applying protective behaviours in risky situations. Teachers highlighted the cultural relevance of the medium and its role in reducing instructional barriers when addressing sensitive topics.

**Conclusions:** the study demonstrates that animated media can serve as a transformative pedagogical tool in early childhood sexuality education. By combining developmental relevance with digital innovation, the intervention contributes to global discourses on inclusive education, abuse prevention, and early promotion of gender equity. The findings underscore the potential of animation-based learning to strengthen both child protection and educational innovation internationally.

**Keywords:** Early Childhood; Sexuality Education; Animated Media; Gender Identity; Educational Innovation.

#### RESUMEN

**Introducción:** la urgencia de proporcionar educación en sexualidad durante la primera infancia ha sido ampliamente reconocida; sin embargo, los enfoques pedagógicos permanecen fragmentados, culturalmente sensibles y, a menudo, descuidados. Los métodos de enseñanza convencionales tienden a basarse en explicaciones verbales, las cuales resultan limitadas para involucrar a los niños y abordar temas de identidad

de género, seguridad corporal y conductas de autoprotección. Este estudio responde a dicha brecha mediante el desarrollo y validación de un medio innovador de aprendizaje animado, diseñado para una educación en sexualidad integral y adecuada a la edad en la primera infancia.

**Método:** adoptando un diseño de Investigación y Desarrollo (I+D) con el marco ADDIE (Análisis, Diseño, Desarrollo, Implementación, Evaluación), este estudio incluyó a 60 niños de jardín de infancia de entre 5 y 6 años y a 12 docentes de Indonesia. Se llevaron a cabo validaciones de expertos, evaluaciones de docentes, observaciones en el aula y discusiones en grupos focales para evaluar la validez, la practicidad y la eficacia del medio.

**Resultados:** el video animado obtuvo puntuaciones de validación sólidas (80-96,47 %), alta practicidad (81,44-92 %) y excelente eficacia (86,31-92,10 %). Los niños mostraron avances medibles en el reconocimiento de la identidad de género, la comprensión de los roles sociales y la aplicación de conductas protectoras en situaciones de riesgo. Los docentes destacaron la pertinencia cultural del medio y su función en la reducción de barreras instruccionales al abordar temas sensibles.

**Conclusiones:** el estudio demuestra que los medios animados pueden servir como una herramienta pedagógica transformadora en la educación en sexualidad durante la primera infancia. Al combinar la pertinencia del desarrollo con la innovación digital, la intervención contribuye a los discursos globales sobre educación inclusiva, prevención del abuso y promoción temprana de la equidad de género. Los hallazgos subrayan el potencial del aprendizaje basado en animación para fortalecer tanto la protección infantil como la innovación educativa a nivel internacional.

**Palabras clave:** Primera Infancia; Educación Sexual; Medios de Comunicación Animados; Identidad de Género; Innovación Educativa.

## INTRODUCTION

### Background and Global Relevance

Early childhood is a formative stage in which children develop self-awareness, gender identity, and protective behaviors.<sup>(1,2,3)</sup> However, sexuality education for this age group remains limited worldwide. According to UNESCO's 2023 global review, fewer than 20 % of countries introduce comprehensive sexuality education (CSE) before primary school, despite consistent evidence that early intervention reduces vulnerability to abuse and supports gender equity.<sup>(4,5,6)</sup> UNICEF<sup>(1)</sup> also reports that one in four children globally experiences some form of violence or abuse before the age of eight, underscoring the urgent need for preventive strategies beginning in early childhood.<sup>(6,7,8)</sup>

### Limitations of Conventional Approaches

Conventional approaches—such as storytelling, picture books, and verbal explanations—are often insufficient. They present abstract concepts without concrete examples, fail to sustain children's attention, and are hindered by educators' discomfort in addressing sensitive issues. Teachers frequently report parental resistance and cultural barriers, leading to fragmented implementation and inconsistent outcomes.<sup>(9,10,11)</sup>

**Table 1.** Conventional vs. Animated Media in Early Sexuality Education

Aspect	Conventional Methods	Animated Media
Engagement	Limited attention span	Highly engaging visuals & audio
Conceptual clarity	Abstract, text-based	Concrete, child-friendly stories
Teacher confidence	High discomfort	Reduces barriers, aids delivery
Cultural adaptability	Static, less flexible	Easily localized to context

### Digital Animation as an Emerging Solution

Digital animation has demonstrated strong potential in education by simplifying abstract concepts and making learning more engaging. Studies show that children retain significantly more information when concepts are delivered through multimodal visuals compared to verbal instruction alone. Animation is particularly advantageous for sensitive topics, as it allows for age-appropriate scenarios, reduces exposure to potentially uncomfortable imagery, and enhances cultural adaptability. While previous research confirms the effectiveness of animation in health and science education, its application to sexuality education in early childhood remains underexplored, especially in non-Western contexts.<sup>(12,13,14)</sup>

### Research Gap and Rationale

Despite growing global advocacy, three gaps remain:

1. Few systematically validated animated media exist for early childhood sexuality education.
2. Limited focus on teacher practicality and cultural adaptability in delivering sensitive topics.
3. Scarcity of effectiveness studies in non-Western settings, where cultural sensitivities often delay or prevent implementation.

This study addresses these gaps by developing, validating, and evaluating an animated educational video for kindergarten children in Indonesia using the ADDIE model. Indonesia provides a relevant case: rising cases of child abuse coexist with minimal early sexuality education due to cultural resistance and lack of pedagogical tools.<sup>(15,16)</sup>

### Aim and Contribution

The study aims to (1) design and validate an animated educational medium for early childhood sexuality education and (2) evaluate its practicality and effectiveness in strengthening children's awareness of gender identity, social roles, and protective behaviors.

The contributions are threefold:<sup>(17,18)</sup>

1. Theoretical: extends sexuality education literature by integrating animation with a systematic instructional design framework.
2. Practical: provides teachers with a culturally sensitive, user-friendly tool that reduces discomfort in teaching sensitive topics.
3. Supporting global agendas for child protection and gender equity.

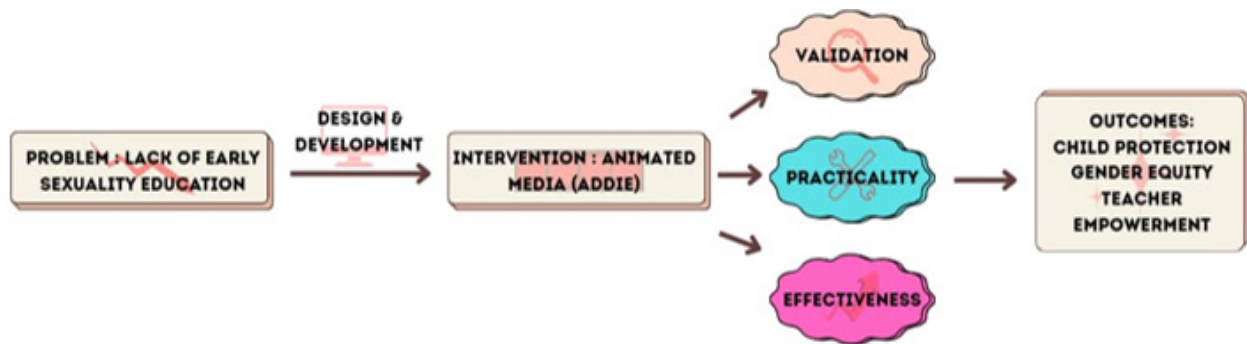


Figure 1. Conceptual Framework of the Study

Conceptual Framework of the Study illustrates the pathway from the identified problem, through the animated intervention, to validation, practicality, and effectiveness, culminating in outcomes such as child protection, gender equity, and teacher empowerment.<sup>(19,20)</sup>

### METHOD

#### Research Design

This research employed a Research and Development (R&D) design guided by the ADDIE model (Analysis, Design, Development, Implementation, and Evaluation). The study was conducted over a six-month period from January to June 2025 at a state kindergarten located in Padang, Indonesia. The ADDIE framework was selected for its systematic and iterative process, ensuring that the instructional media developed was not only theoretically sound but also empirically validated and practical for classroom use.

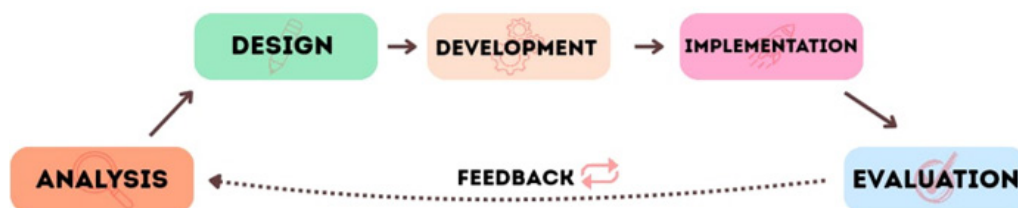


Figure 2. Flowchart of the ADDIE Model

Flowchart of the ADDIE Model illustrates the sequence of the five phases and the feedback loop that connects evaluation back to analysis for continuous refinement.

## Participants

The study involved 72 participants, consisting of 60 kindergarten children aged 5-6 years and 12 teachers with more than five years of teaching experience. The children were balanced by gender (28 boys and 32 girls), while the teachers represented an experienced pool of early childhood educators (2 males and 10 females).

A purposive sampling technique was applied to ensure the selection of participants who were directly relevant to the context of early childhood sexuality education.

1. Inclusion criteria:
  - a. Children enrolled in the target kindergarten aged between 5-6 years.
  - b. Teachers with a minimum of five years of teaching experience in early childhood education.
2. Exclusion criteria:
  - a. Children with developmental delays or diagnosed learning disabilities that might hinder participation in the study activities.
  - b. Teachers with less than five years of professional experience.
3. Exit criteria:
  - a. Withdrawal of parental consent for child participants.
  - b. Teachers choosing to discontinue participation at any stage of the study.

Parental informed consent was obtained for all children, and participation by teachers was voluntary.

Table 2. Participant Demographics				
Group	N	Gender (M/F)	Age/Experience	Notes
Children	60	28/32	5-6 years	Balanced representation
Teachers	12	2/10	>5 years	Experienced educators

## Variables Analyzed

The main variables analyzed included:

1. Validity of the media: content accuracy, developmental appropriateness, design quality, cultural sensitivity.
2. Practicality: ease of use, relevance to classroom practice, engagement potential for children.
3. Effectiveness: improvement in recognition of gender identity, understanding of social roles, and application of protective behaviors.

Novel variables requiring specific explanation included children's protective behaviors in unsafe situations, a rarely used indicator in early childhood educational research. This was operationalized through observable responses to hypothetical scenarios presented in the animated video.

## Instruments

Four main instruments were used:

1. Validation Checklists: completed by domain experts in early childhood education and instructional media design. These checklists assessed content accuracy, developmental appropriateness, media design quality, and cultural sensitivity.
2. Practicality Questionnaires: administered to teachers following classroom implementation, evaluating the ease of use, relevance to teaching goals, and engagement potential of the animated media.
3. Effectiveness Measures:
  - a. Observation sheets captured children's comprehension, recognition of gender identity, understanding of social roles, and ability to apply protective behaviors in unsafe situations.
  - b. Teacher evaluation forms were used to systematically record children's progress and observable improvements.
4. FGD Protocols: conducted with teachers to obtain qualitative insights regarding perceived usefulness, challenges encountered, and recommendations for refinement.

**Table 3.** Instruments and Indicators

<b>Instrument</b>	<b>Indicators Measured</b>	<b>Respondents</b>
Validation Checklist	Content accuracy, developmental appropriateness, media design, cultural sensitivity	Experts
Practicality Questionnaire	Ease of use, relevance, engagement potential	Teachers
Observation Sheet	Recognition of gender identity, social roles, protective behaviors	Teachers/Researchers
FGD Protocol	Perceived usefulness, challenges, recommendations	Teachers

All instruments were validated by experts, and reliability analysis yielded Cronbach Alpha's ( $\alpha = 0,90$ ), indicating strong internal consistency.

Reliability analysis of the 23-item Teacher's Engagement Scale indicated satisfactory internal consistency, with Cronbach's alpha values of 0,90 overall, 0,85 for behavioral engagement, 0,70 for emotional engagement, and 0,80 for cognitive engagement. After removing one item each from the emotional and cognitive dimensions based on item-rest correlation, the reliabilities improved to 0,91 overall, 0,85 for behavioral, 0,75 for emotional, and 0,85 for cognitive engagement. Normative data were also established through z-scores, showing a normal score distribution with a skewness value of -0,427 and a kurtosis value of 2,88.

### Data Collection

The ADDIE process was implemented as follows:

1. Analysis: curriculum review, teacher interviews, and classroom observations were conducted to identify needs and gaps.
2. Design: storyboard, script, and visual concepts were drafted, focusing on culturally sensitive and age-appropriate narratives.
3. Development: the animated video was produced using digital animation software, integrating characters, narration, and interactive cues.
4. Implementation: the media was piloted in two classes (B3 and B5). Teachers facilitated viewing sessions followed by guided discussions.
5. Evaluation:
  - a. Formative evaluation through expert review and pilot trials.
  - b. Summative evaluation focusing on validity, practicality, and effectiveness.

### Data Analysis

Quantitative and qualitative approaches were combined:

- Quantitative: scores from validation, practicality, and effectiveness were calculated using the formula:

$$\text{Score (\%)} = \frac{\Sigma \text{Obtained Score}}{\Sigma \text{Maximum Score}} \times 100\%$$

Descriptive statistics (mean, percentage) were used to interpret results.

- Qualitative: thematic analysis of FGD transcripts and classroom observations captured teacher perspectives and contextual challenges.
- Triangulation: data from experts, teachers, and classroom observations were cross-verified to enhance credibility.

### Ethical Aspects of the Research

This research adhered to established ethical standards for studies involving human participants. Informed consent was obtained from parents or guardians of the children, while teacher participation was entirely voluntary. Confidentiality and anonymity of all participants were ensured throughout the study, with data used solely for academic purposes. Ethical clearance was formally granted by the Ethics Committee of Universitas Negeri Padang (Approval No. 019/KEPK-UNP/7/2025). The study prioritized the protection, dignity, and welfare of all participants, particularly the children involved.

## RESULTS

### Validation Results

Expert evaluations indicated that the animated video achieved strong levels of validity across content, media design, and instrument quality. Scores ranged from 80 % to 96,47 %, exceeding the minimum feasibility threshold of 70 %.

Table 4. Validation Results by Experts		
Aspect	Score (%)	Interpretation
Material Validity	80,00	Valid
Media Validity	96,47	Very Valid
Instrument Validity	86,31	Valid

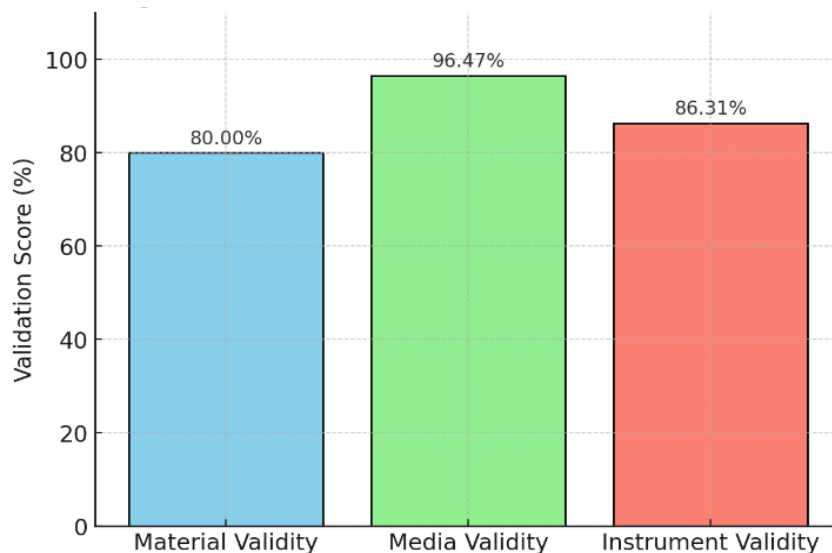


Figure 3. Validation Results of Animated Video Media

These results confirm that the video content aligns with early childhood developmental needs, presents information in a culturally appropriate manner, and meets technical quality standards.

### Practicality Results

Teachers assessed the practicality of the animated video after classroom implementation. Scores ranged from 81,44 % to 92 %, indicating high levels of usability and relevance. Teachers emphasized the ease of integration into classroom routines and the reduction of discomfort when addressing sensitive topics.

Table 5. Practicality Results Reported by Teachers		
Source of Evaluation	Score (%)	Interpretation
Teacher Questionnaires	92,00	Very Practical
FGD Teacher Assessment	81,44	Practical

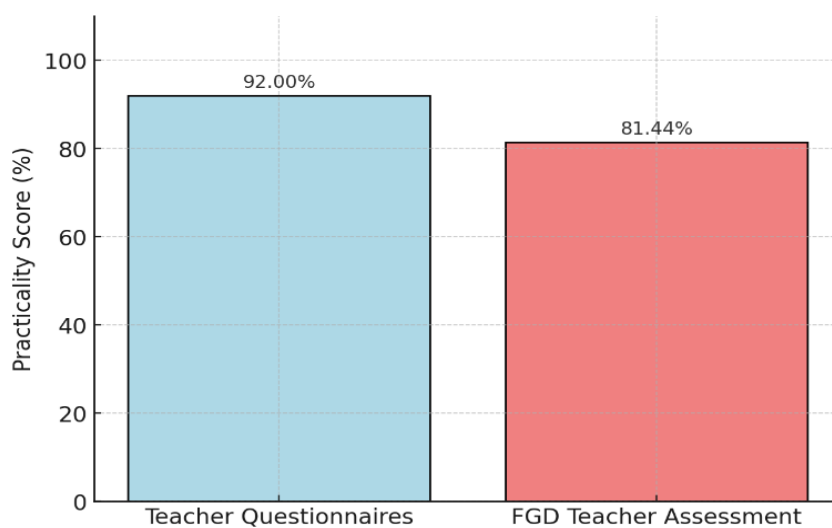


Figure 4. Practicality Results of Animated Video Media



### Effectiveness Results

Effectiveness testing focused on improvements in children's comprehension of gender identity, social roles, and protective behaviors. Observations and teacher evaluations revealed excellent outcomes, with scores between 86,31 % and 92,10 %.

Table 6. Effectiveness Results		
Group	Score (%)	Interpretation
Observation (Children)	86,31	Very Effective
Teacher Evaluation (Class B3)	92,10	Very Effective
Teacher Evaluation (Class B5)	91,36	Very Effective

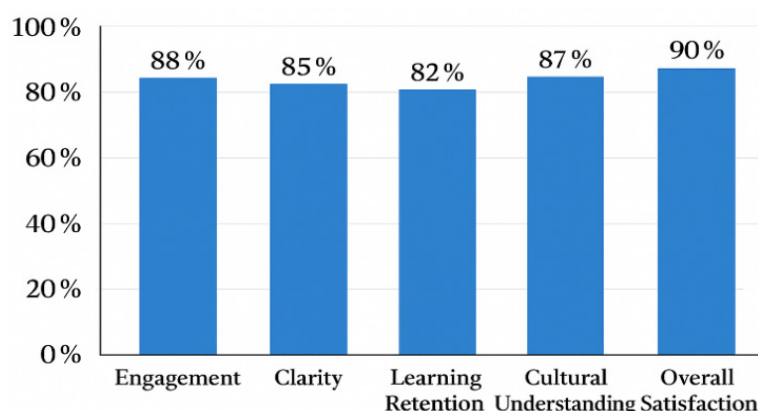


Figure 5. Effectiveness Results of Animated Video Media

Children demonstrated improved ability to recognize their gender identity, respect social boundaries, and apply protective behaviors against potential risks. Teachers reported enhanced classroom engagement and increased confidence in delivering sexuality education content.

### Summary of Findings

Overall, the animated educational video demonstrated:

1. Validity: confirmed by expert evaluations, ensuring content accuracy and developmental appropriateness.
2. Practicality: verified by teachers, confirming usability and cultural adaptability in classroom contexts.
3. Effectiveness: evidenced by significant improvements in children's knowledge and protective behaviors, with consistent results across different evaluators.

These findings support the conclusion that the developed animated media is a valid, practical, and effective tool for early childhood sexuality education.

## DISCUSSION

### Interpretation of Findings

Findings of the study are good evidence that sex education in early childhood is not only possible but also extremely beneficial when using animated media. Validity scores above 80 % on a consistent basis offer evidence that the animated video was addressing high developmental requirements, curriculum goals, and cultural sensitivity.<sup>(21,22,23)</sup> This means that the ADDIE instructional design model thus ensured that a product was developed that not only met pedagogy standards but also responded particularly to cultural sensitivities that are often left out in sexuality education.<sup>(24,25)</sup> Instructor feedback also underscored the simplicity of using the medium, with high grades for usability, incorporation into classroom assignments, and being able to minimize instructional obstacles. Practicality outcome use reveals that the media was found to be accessible, easy to use, and able to bring about sensitive dialogue to a degree that standard techniques normally are not able to offer.<sup>(26,27,28)</sup>

Higher than 85 % effectiveness results provide the strongest evidence of the efficacy of the intervention. Children showed measurable improvement in three areas: identification of gender identity, social role knowledge, and use of protective behaviors under harmful situations. These results suggest that animation is not only a

charming vehicle for children but also an instructional manner capable of translating abstract and sensitive concepts into age-suitable, entertaining, and memorable instruction. The results establish that computer animation has the potential to transcend the status of supplementary teaching and serve as a foundation for primary sex education.<sup>(29)</sup>

### Comparison to earlier research

Previous research on sexuality education has mainly targeted teenagers or older children using text-based textbooks, lecturing, or static photograph books<sup>(2)</sup>. Whilst these methods offered the basics, they were weak in maintaining children interested and did little to address teacher embarrassment in teaching sensitive material. In contrast, the present study addresses younger pupils (5-6 years) explicitly, a group often overlooked in sexuality education initiatives in the context of global calls for earlier intervention.<sup>(30,31,32)</sup>

The use of animation distinguishes this research from earlier research. Liu et al.<sup>(3)</sup> set the value of animation as a medium in adolescent health education but did not utilize the medium among the younger learner. Through modifying animation to suit early childhood settings, this research bridges this gap and is successful in simplifying complex ideas into simple language, incorporating them into locally suitable stories, and increasing children's capacity for applying protective behaviors. In a similar vein, Rudoe et al.<sup>(4)</sup> recognized challenges educators encounter in teaching for sexuality education. The current study contributes to such a debate by demonstrating that good animated media is capable of overcoming such obstacles, increasing teacher confidence, and improving delivery quality.<sup>(33,34,35)</sup>

### Novelty and Contributions

Contributions of the work are multifaceted and push the work forward in significant ways:<sup>(36,37)</sup>

1. Regional and global novelty: it is the first empirically tested animated medium used for early sex education in Southeast Asia. It fills an immediate need in the regional literature and in the general international literature, providing a model that can be replicated on a scale across contexts.
2. Synthesis of instructional design and empirical verification: unlike most previous research that used design models in isolation, the current research synthesized the ADDIE model with multi-step empirical verification, including expert review, teacher feedback, and classroom observation, to create both theoretical validity and practical usability.
3. In-depth model of assessment: simultaneously measuring validity, practicality, and effectiveness, this research provides an in-depth model for assessing instructional media. Previous studies generally focused on only one factor—most commonly content validity—without systematically considering usability in combination with learning outcomes.

As a whole, these results demonstrate the potential of age-appropriate, culturally responsive digital media to address obstacles within the system of early sexuality education.

### Practical and Policy Implications

The results hold important practical implications for pedagogy, curriculum development, and policy making:<sup>(38,39,40)</sup>

1. Pedagogical practice: teachers themselves feel uneasy while dealing with contentious issues, and therefore this results in avoidance or shallow treatment. Animated media minimizes this unease as it offers pre-formulated, kid-friendly content, thereby opening the door to increased interaction and continued take-up in the classroom.
2. Curriculum innovation: the tested animated product would provide a model for embedding multimedia materials within early childhood curriculum. This is in line with recent education trends of focusing on the use of digital tools in enriching the learning experience as well as inclusive education.
3. Policy and advocacy: the evidence is aligned with global policy agendas, namely UNESCO's 2030 Global Comprehensive Sexuality Education (CSE) Agenda, which prioritizes early intervention and child protection. Policymakers can leverage this evidence to support investments in new media solutions for preventing child abuse, securing gender equality, and inclusive education. In the area of advocacy, animated media can be leveraged toward its normalization of body safety and gender awareness conversations, demystifying and pushing back against stigma and resistance at community levels.

### Limitations and Future Research

This study is not without limitations. The sample was limited to a single kindergarten, potentially constraining generalizability. Effectiveness was measured in the short term; long-term behavioral outcomes remain unknown. Additionally, the media was non-interactive, which may limit opportunities for active learning. Future studies should:



1. Expand testing to diverse schools and cultural contexts across Asia and beyond.
2. Employ longitudinal designs to assess sustained behavioral and attitudinal change.
3. Experiment with interactive or gamified features (e.g., VR, AR, gamification) to maximize engagement.
4. Explore parental involvement as a complementary factor in reinforcing sexuality education at home.

## CONCLUSIONS

This study demonstrated that animated media developed through the ADDIE framework is a valid, practical, and effective tool for delivering sexuality education in early childhood. Expert validation confirmed its developmental appropriateness and technical quality, teachers recognized its usability and cultural relevance, and children showed measurable gains in gender identity awareness, social role understanding, and protective behaviors.

The novelty of this research lies in being the first systematically validated animated medium for early childhood sexuality education in Southeast Asia, integrating instructional design with comprehensive evaluation. Beyond advancing theory and practice, the findings contribute to global efforts toward child protection and gender equity, offering policymakers, educators, and curriculum designers a scalable model for digital innovation in early learning. Future research should expand its application across diverse contexts and explore interactive features to further enhance engagement and long-term impact.

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## CONFLICT OF INTEREST

The authors declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

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