

## **Development of the I Take Care of Myself educational game application to enhance early childhood sex education knowledge**

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**Abstract:** Sexual crimes against children continue to be rampant, and this is due to the fact that children lack the sexual understanding and vocabulary necessary to tell what has happened to them to adults. This study aims to investigate the effectiveness of the android-based educational game application I take Care of Myself on the sexual education of young children. Research and Development (R&D) development research is the methodology employed. This development research technique pertains to the 4-D model (define, design, develop and distribute) (define, design, develop and disseminate). Four experts (material experts, media experts, linguists, and teachers) tested the feasibility of this educational game as a learning medium. Test the hypothesis using the Paired Sample T-test to assess the effectiveness of this educational game. Following the findings of four experts, it was determined that the educational game I take Care of Myself belonged in the very practicable category and should be implemented. The results of the two-tailed significance test indicate that the educational game I take Care of Myself can increase early childhood sexual education knowledge.

**Keywords:** Early childhood, Educational Game, Sex Education

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**Received** 18 December 2022; **Accepted** 01 September 2023; **Published** 13 September 2023

**Citation:** Khaira, U., Indryani, I., Rosyadi, A.F. (2023). Development of the I Take Care of Myself educational game application to enhance early childhood sex education knowledge. *Premiere Educandum : Jurnal Pendidikan Dasar dan Pembelajaran*, 13(1), 62 – 74.

Doi.org/10.25273/pe.v13i1.14762



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## INTRODUCTION

The Indonesian government has made considerable commitments to child welfare and given priority to safeguarding children from violence under the 2030 Sustainable Development Agenda. The SDGs' emphasis on investments in human development, such as the provision of health services and child protection, is reflected in Indonesia's national development plan 2020–2024. Children are not safe to sexual crimes, though. In the last five years, there has been a significant rise in the number of sexual crimes that have taken place in Indonesia. 14,517 incidents of violence against children were reported in 2021, according to the Ministry of Women's Empowerment and Child Protection, of which 45.1% involved sexual assault. This number equivalent to approximately 6,547 instances of child sexual abuse in 2021 (Kemenpppa, 2021). Cases of sexual violence against children are an iceberg phenomena, which means that there may be more cases than are now recognized.

Coercion, fear, or misleading a kid into engaging in sexual behavior constitute sexual violence against children (Paramastri & Priyanto, 2010). Sexual harassment, according to Chomaria (2014), includes verbal and non-verbal conduct in addition to physical touch. This behavior can include exposing the child's genitalia, making the child expose his genitalia, or displaying sexual imagery. In addition to these deeds, the victim feels uneasy around words, jokes, criticism or comments, and invites. However, it is assumed that victims who immediately come into physical touch with the harasser or get the harassing behavior directly are those cases of sexual harassment that are frequently discovered. A child who has experienced sexual violence may be traumatized, which may have a negative impact on his physical, psychological, and social aspects (Zuraidah, 2019; Amaliyah & Nuqul, 2017). Additionally, children who encounter sexual violence will experience mental issues, low self-esteem, and anxiety (Tursilarini, 2017).

Because children are still very innocent and lack sexual understanding or even a vocabulary that would allow them to tell others what happened to them, sexual crimes against children continue to be rife. Encouraged early childhood safety experts to advocate for the value of sex education in children from a young age. This education is provided so that young children are aware of themselves, their sex organs, and how to defend themselves against those who may have bad intentions for them. In Indonesia, there is a situation where teaching children about sex, especially at a young age, is considered to be taboo (Palupi, 2017). Due to their incorrect perception of sexual education, parents then attempt to divert the topic with their kids regarding sexuality (Anggraeni, 2014; Davies & Robinson, 2010). Parents believe that sexual education should only teach kids about reproductive organs and that calling kids penis or vagina is inappropriate (Ningsih, 2018).

Early sexual education will help it be easier for young children to realize their potential, increasing their self-esteem and self-confidence and equipping them with a healthy personality and positive self-acceptance to withstand future distress (Soesilo, 2021). To ensure the success of sex education in schools, it is essential to have access to instructional media. Previous research has identified numerous media kinds for sex education, including video media, books, comics, modules, guidance boards, and pop-up books. The Sex Education Pocket Book, created by Hidayat et al. (2016), can serve as a teaching tool for introducing sex education to children aged 3 to 6. Research Vidayanti et al. (2020) discusses the use of animated videos in sex education medium. The findings of this study indicate that animated media in the form of videos is highly successful at SD Negeri Mustokorejo Yogyakarta for increasing children's sexual education knowledge. Digital games have not yet become the standard for education in Indonesia due to a shortage of educational game developers, which is backed by the common belief that playing games is a waste of time and has no purpose. Many studies currently identify the benefits of digital games as learning tools that improve students' interest in learning, therefore this misconception is only sometimes accurate. With the use of mobile and

computer technologies, digital games have become a component of the learning media because they no longer give simply entertainment but also activities related to learning content. Digital games are transformed into educational games. According to Edwards (2013), children's digital educational games can give engaging learning experiences and enhance their imagination. Digital educational games are used in education not just to strengthen certain skills, but also to develop several skills, such as verbal-linguistic, logical-mathematical, and visual-spatial.

Based on this, it's important to make early childhood sex education media, like an educational game called I take Care of Myself that can be played through an Android app. It can be downloaded for free, and teachers and parents can use it to teach children about sexuality. Such as knowing how a child's body works, which parts can and can't be shown to strangers, what each part does, how to spot sexual abuse as soon as possible, and teaching children to always tell stories when their private parts are opened or touched by strangers. This study also looked at how well the educational game I take Care of Myself works as a way to learn about sex education for young children and how well it can be used.

## METHODS

### Research Design

This research is development research with the objective of designing, developing, and evaluating something in order to provide a higher quality product, tools, or models (Richey & Klein, 2014). This study employs the 4-D development model created by Thiagarajan, Semmel, and Semmel. This paradigm has four phases: definition, design, development, and dissemination. The methodology is utilized to design learning media for the android-based educational game application I take Care of Myself as a medium for sex education for early childhood to prevent sexual assault and to determine the effectiveness and feasibility of this educational game as a learning medium.

### Research Subjects

Students aged 5 to 6, made up the study's population. Cluster random sampling was the method used for the study's sampling. Twenty students consisting of 11 male students and 9 female students served as the sample for this study. The level of students' ability to understand the material varies.

### Data Collection and Instrument Techniques

Descriptive qualitative methods, validation tests for expert judgment, and trials were utilized to collect data. A preliminary analysis of problems in the process of early childhood sexual education, interviews with teachers, comments and suggestions for improving the application from linguists, early childhood learning material experts, and media experts, as well as the teacher's positive response to the application's effectiveness, provided qualitative data. The expert validation questionnaire is aimed at linguist, material experts, media experts, and teachers to find out the feasibility of educational game in terms of material and media. The grid of expert validation questionnaire instruments is presented in TABLE 1.



FIGURE 1. Development model

**TABLE 1.** *Instruments*

<b>Expert</b>	<b>Assessment Aspect</b>
Material	Suitability content with competency criteria
	Material accuracy
	Encourage curiosity
Media	Color
	Typography
	Illustration
	Layout
	Display of the User Guide
Linguist	Linguistic proficiency in relation to student growth
	Grammatical
	Lexical usage and sentence structure

**TABLE 2.** *Criteria for level of validation results*

<b>Percentage(%)</b>	<b>Criteria</b>
81-100	Very Feasible
61-80	Feasible
41-60	Less Feasible
21-40	Not Feasible
0-20	Very Inappropriate

Linguists from the Indonesian Language Education study program, material experts from the Early Childhood Teacher Education study program, and media experts from the Information Systems study program served as validators in this study. The learning practitioners in this study were Harapan Bunda Kindergarten teachers. Quantitative data included questionnaire scores from early childhood sex education material experts, linguists, and media experts, teacher response questionnaire filling scores, and children's learning outcomes scores.

**Data Analysis Technique**

The data analysis technique utilized is a validity feasibility analysis of the educational game I take Care of Myself. The data was gathered from four validation experts: material experts, linguists, media experts, and teachers. Each of these indicators has scoring criteria ranging from 1 to 5. The collected results are then written in the corresponding column of the table. Furthermore, the values acquired at intervals for defining the level of validation of the aducational game I take Care of Myself were presented in Table 2.

To see the effectiveness of educational game, the trial was conducted on 20 students. One-Group Pretest-Posttest Design, which is an experiment conducted in a single group without a comparison group, is the type of experiment employed. A pretest is given before the treatment in this design since there is no control variable. As a result, since they can be compared to both the pre- and post-treatment states, the results of the treatment may be determined more precisely. The Paired Sample T-test is used as a parametric statistical test in this study since the data originates from two different variables that are related to one another.

First, the examination of the precondition test, namely the normality test, is performed. It can be shown in this research how influential the educational game is on the children's knowledge of sex education in Harapan Bunda Kindergarten. The effect size formula is used to determine the magnitude of the effect. Effect size is a measurement of the magnitude of a variable's effect on other variables, the magnitude of the difference, and the relationship that is unaffected by sample size.

## **RESULTS**

A 4D model is used to make educational games. This model has four steps: defining, designing, developing, and disseminating. The product made is an educational game app for Android called I take Care of Myself that helps kindergarten students learn. The purpose of this research is to produce a proper and effective educational game.

### **Defining**

In the analysis phase, there are three stages: preliminary analysis, child characteristics analysis, and material analysis. In the first stage, class teachers were interviewed for a preliminary analysis. According to interviews, the 2013 curriculum contains a theme about me and a sub-theme about my body. The daily learning implementation plan include tasks to name the body parts and their roles, count the number of parts, and clean the body parts. Early childhood education materials have not yet addressed sex education.

Children are protected from sexual violence by having a better understanding of their own and the other sexes' bodies through the teaching of sex education. Learning media are crucial for the effectiveness of sex education in schools. According to Jean Piaget's theory of cognitive development, children over the age of six enter the concrete operational stage. Preliminary observations conducted by researchers at Harapan Bunda Kindergarten indicate that children aged 5 to 6 years are more interested in creative activities such as sticking, cutting, matching, and constructing products from used materials. When a teacher employs a lecture method, students quickly become bored (Thompson, 2021). Media criteria are tailored to children's needs, namely interesting, innovative and fun. Learning activities with audio and visual effects will stimulate children's interest more. The efficiency and quality of learning can both be accelerated with the use of technology. It provides an excellent way to speed up the delivery of teaching materials by teachers (Kilag et al., 2022). Using this Android-based educational game, parents and educators may educate their children with age-appropriate information about sex education.

Researchers analyzed at how students learned in class as part of their analysis of students. When the teacher reads a story, the child has trouble paying attention and pays no attention to the teacher. At a young age, children have trouble understanding abstract ideas (Inhelder & Piaget, 2013). To help them understand something, children need things or symbols that show it to them (Patria & Mutmainah, 2018). To get kids interested in a learning activity, use pictures to show what's going on. The pictures try to show what the child is thinking and what the story is about. Another observation shows that children can use modern technology like smartphones to play games, watch videos, and learn while playing.

The material analysis includes the determination of material adapted to the applicable curriculum in schools and developed with references related to the material to achieve students' learning objectives. From searching various scientific journals, it was found that sex education material for early childhood that is relevant, among others, is the first material regarding identifying body parts. According to Jatmikowati et al. (2015), children will know the names and functions of body parts in the material on body parts. The second material introduces gender identity, explaining to children that humans are divided into two, namely men and women, who can be distinguished by specific

characteristics. In identifying gender, children will understand their gender, and in introducing the names of the genitals to children, it is better to use real names and not fake ones (Suhamsi & Ismet, 2021; Hikmah, 2017; Yafie, 2017). The third material is about self-protection skills from sexual crimes. Children must understand which body parts can be touched and which others cannot, even though they are family members. The fourth material is recognizing situations that lead to tendencies of sexual exploitation among the fifth material is toilet training. In toilet training, children are introduced to toilet etiquette.

### Designing

Based on the results of the analysis in the previous stage, the android-based educational game I take Care of Myself will be built with 2D images, and the target demographic of the game made is focused on children. This game contains an animated story about a child who can save himself from a perpetrator of sexual harassment, equipped with background sound, illustrated images, and the voice of the narrator who reads the story. There is also a message at the end of the story. Several educational games, namely body puzzle, Boys & Girls, Good Touch & Bad Touch. Besides that, there is also a song entitled Lindungi Tubuhku.

The researcher designed an application interface that could be used as a reference or description of the educational game application I take Care of Myself to make application development more manageable. The flow of the educational game application I take Care of Myself is illustrated in the Figure 2.

### Developing

The development phase includes transforming the previous stage's design into an educational gaming product. The development stage starts with the construction of the initial product, which is accomplished by combining the designed assets into Godot Engine in accordance with the original design. The next step is to write code to offer logic for the buttons and assets that have been entered. This application was created with Godot Engine tools, the GDScript programming language, Adobe Photoshop CS3 for creating 2-dimensional visuals, and Audacity for sound editing. The educational game application I take Care of Myself requires at least 1 GB of RAM and an Android operating system Nougat or newer. This game is single-player or played alone.



	<p>This splash screen display will appear temporarily when the user runs or opens the application. The splash screen displays a boy and a girl character.</p>
	<p>The main menu page display contains menus for children's stories, games, and songs. There is a setting button and an exit button.</p>

FIGURE 2. Storyboard

**TABLE 3.** *Assessment of material experts*

<b>Assessment Aspects</b>	<b>Assessment Validator</b>
Suitability content with competency criteria	5
Material accuracy	4
Encourage curiosity	5
Total	14
Average	4,6
Percentage	93%
Category	Very Feasible

**TABLE 4.** *Assessment of media experts*

<b>Assessment Aspects</b>	<b>Assessment Validator</b>
Color	5
Typography	5
Illustration	5
Layout	4
Display of the User Guide	4
Total	23
Average	4,6
Percentage	92%
Category	Very Feasible

**TABLE 5.** *Assessment of linguist*

<b>Assessment Aspects</b>	<b>Assessment Validator</b>
Linguistic proficiency in relation to student growth	5
Grammatical	4
Lexical usage and sentence structure	4
Total	13
Average	4,3
Percentage	86%
Category	Very Feasible

**TABLE 6.** *Assesment of teacher*

Assessment Aspect	Result			Average
	Teacher 1	Teacher 2	Teacher 3	
Learning design	100%	100%	100%	100%
Operational	80%	80%	80%	80%
Visual communication	93,3%	93,3%	100%	96,6 %
Average	91,1%	91.1%	93.3%	92%
Criteria	Very Feasible			

After the educational game is built, the next stage is to evaluate the feasibility of the educational game I take Care of Myself as a learning media. Linguists, media experts, and material experts carried out this assessment. The validator provided an assessment and gave responses which were then revised. The material aspects of the game are very feasible and suitable for early childhood. Suggestions for improvement from media experts are to increase the intro volume of the game's theme song and complete some sounds that need to be corrected or are still empty. In addition, the validator advises in the Maze Run game section to make all the correct multiple-choice answers with green boxes. After revising the media, the validator provides a final assessment using the media feasibility assessment instrument. Figure 3 is the display of the educational game after revision. This educational game application also presents a video clip for a song entitled *Protect My Body*. This song aims to introduce body parts that may be touched and which may not be touched by others. As well as what the child should do if someone else approaches and touches the forbidden area. The song has also been published on the YouTube page (Figure 4). Product feasibility assessment data were obtained from a questionnaire filled in by linguists, early childhood education materials experts, media experts, and teachers. The scale in this study uses a Likert scale with five intervals. Table 3-5 is the result of validating the feasibility of the Android-based educational game I take Care of Myself application product by the validator. Based on Table 3, the average score of all aspects of the assessment by material experts is 4,6 (93%) which falls into the very feasible category. The lowest score is in the Material accuracy, which is 4. Based on Table 4, the average score of all aspects of the assessment by media experts is 4,6 (92%) which falls into the very feasible category to be tested with revisions as suggested. The lowest score is in the Display of the User Guide and layout aspect, which is 4. Table 5 shows the results of the linguist's assessment of the media, which show that 86% of the suggestions are Very Feasible to implement.

The quality of educational games is demonstrated by the validation data results from teachers, which are shown in Table 6. The average scores for each aspect are as follows: aspects of learning design with an average value of 100%, the operational aspect with an average value of 80%, and visual communication with an average of 96.6%. A 92% average score is obtained after analyzing the data, placed it in the Very Feasible category for implementation.

Material experts got a 93% score, media experts got a 92% score, language experts got an 86% score, and teachers got a 92% score. The average score was 90.75%, which is in the very feasible category. Based on the results, it seems likely that the educational game I take Care of Myself could be used in the next stage.

## Disseminating

The educational game I take Care of Myself was approved for use as a teaching tool; the next stage was to evaluate its effectiveness. The purpose of the operational experiment was to see whether utilizing the educational game would increase knowledge about early sex education. Observation in this study discovered a rise in students' sexual education knowledge. The purpose of the observation was to compare the students' knowledge before and after utilizing the educational game. The result of the study is a description of the empirical data related to the investigated data, specifically pre- and post-test data. Twenty kindergarten students were observed using an observation sheet, producing the result of the research data. Before utilizing the educational game, pre-test data were collected, and after playing the educational game, post-test data were collected. The results of the pre-test and post-test are presented in the following table as the average value, standard deviation, maximum and minimum values.





FIGURE 3. The educational game after revision



FIGURE 4. Lindungi Tubuhku Song Video Clip

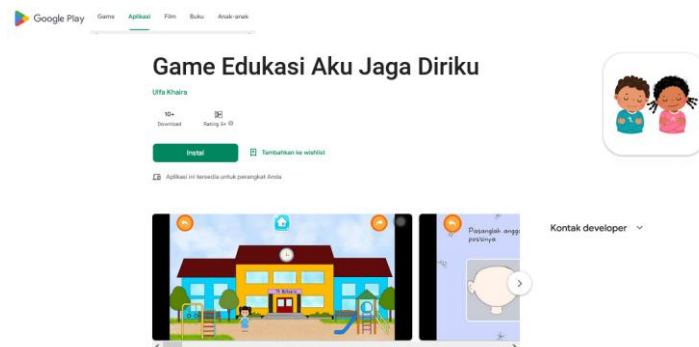


FIGURE 5. I take Care of Myself educational game application on google play store

**TABLE 7.** *Descriptive Statistics*

<b>Data</b>	<b>N</b>	<b>mean</b>	<b>Std. Deviation</b>	<b>Maximum</b>	<b>Minimum</b>
Pretest	20	3.904762	2.700088	10	0
Posttest	20	8.238095	1.338087	10	6

Before implementing the hypothesis test, the analysis requirements test was conducted in the form of a normality test. The Kolmogorov-Smirnov test was performed on a single sample for the normality test. A normality test determines whether or not the data is regularly distributed. The decision-making criterion: if the score of Sig. is less than 0.05, it indicates that the data is not normally distributed; otherwise, it indicates that the data is normally distributed. These are the results of the normalcy test: the pre-test data normality score is 0.7124. Since the normality score is greater than the significance score ( $0,7124 > 0,05$ ), we can conclude that the data is normally distributed. In addition, the normality score of the post-test data was 0.1805, which is more than the significance score ( $0.1805 > 0.05$ ), indicating that the data were normally distributed.

In addition, the t-test was used to assess the hypothesis. This research employs a paired-samples t-test to examine its hypotheses. The significance threshold is 0.05. The hypothesis test of the paired-sample t-test is as follows:  $H_0$  is rejected if the value of (Sig.) is less than 0.05, and  $H_0$  is accepted if (Sig.) is greater than 0.05. It earned a significance score of 0.000, and since  $0.000 < 0.05$ , hypothesis  $H_0$  is rejected and hypothesis  $H_1$  is accepted. It can be inferred that the use of an educational game in learning has an effect on students' sexual education knowledge. The effect size calculation was performed to determine the impact of the android-based educational game I take Care of Myself on the knowledge of Kindergarten student. Based on the outcome of the effect size test, Cohen' effect size was determined to be 1.89. Then it can be argued that the impact of using the android-based I take Care of Myself educational game on Kindergarten students' knowledge of sex education is quite strong. This is evident from the interpretation of Cohen's value, which is  $1.89 > 1.00$ , indicating that it meets the strong effect criteria.

The researcher completed the dissemination step after completing the defining, designing, and development stages. During this phase, the educational game that was built was distributed. The educational game that has been produced must be confirmed valid and effective by the validator and the trials before it can be distributed. The distributing stage was completed by uploading the educational game application I take Care of Myself to the Google Play Store. To be available on the Play Store, Google must first grant permission. If the application is approved, it will be made available in the Google Play Store.

The educational game application I take Care of Myself received a rating of 3+ from the Google Play console, which is the IARC (International Age Rating Coalition) standard rating. As a result, the instructional game I take Care of Myself is regarded appropriate for all ages to run and play. Users can find the game on the Google Play store by searching for Game Edukasi I take Care of Myself; the screenshot below shows the application on the Google Play store.

## **DISCUSSION**

The study results show that application development is appropriate for learning media material in introducing early childhood sex education. Utilizing technology is one of the alternatives that must be used because students are less motivated by conventional media (Beardsley et al., 2021; Puspitarini & Hanif, 2019). In the process of educating children, the appropriate technology must be utilized. For children, android-based educational gaming media is a new experience (Hidayah et al., 2022; Afiyati & Iswara, 2020). By focusing on the elements of creativity, digital gaming-based learning games can also increase students' academic achievement and 21st century abilities including creativity,

problem-solving, cooperation, and critical thinking (Bowman et al., 2015). Digital educational games can help kids find new ways to solve problems by making the visual space more attractive, which in turn makes them satisfied (Behnamnia et al., 2020; Hooshyar et al., 2020). By focusing on characteristics such as curiosity and fantasy challenges when building digital games, children's interest and motivation can be raised, hence enhancing the interaction between children and digital games (Zupan et al., 2018).

Several studies have been published on the topic of enhancing student knowledge through learning media. Listianingsih et al. (2020) conducted research on the effectiveness of android-based comics to improve scientific literacy. By using Android-based comics, students can learn more about science. This is clear from the fact that their scores on a pre- and post-test went from 2.20 to 3.40. Umasugi et al. (2018) did a study that showed that using the scramble game can help students improve their vocabulary. The mean score on the posttest was 73.83, which was higher than the mean score on the pretest, which was 61.05. The distance between the pre-test and the post-test is 12.78. It was found that there were differences in the learning outcome of students who were taught using ICT media with students who were taught using conventional learning.

The educational game I take Care of Myself has an effect on the sexual education understanding of Harapan Bunda Kindergarten students, according to an analysis of the data. This fits with what Liu et al. (2014) found, which is that children's use of technology in a classroom context is good for their learning and development. This has been shown in many different fields and subjects. There are a lot of software programs for preschoolers that are educational, interactive, and can help teachers, children, and parents work together. Educational game I take Care of Myself can be used by teachers and parents of students in providing learning and introduction to sex for early childhood. In this game, there is an animated children's story, rules for maintaining safety when meeting strangers, so that it can instil character in children to be alert and take care of themselves when meeting strangers. In the Good Touch & Bad Touch game, children learn to know which body parts others should not touch. For this reason, it is expected that teachers can take advantage of this educational game in learning.

## CONCLUSION

Based on the evaluation of the experts (material experts, media experts, linguists, and teachers), the educational game I take Care of Myself was confirmed to be implementable. According to data analysis, the educational game I take Care of Myself has an effect on the sexual education knowledge of Kindergarten students. In addition, the effect size analysis indicates that this educational game has a significant impact on the children's knowledge. So that, the I take Care of Myself educational game can be used to increase sex education knowledge and can stimulate the cognitive growth of children.

## ACKNOWLEDGMENTS

This project was supported by PNPB funds from the Faculty of Teacher Training and Education, Jambi University (Number: SP DIPA-023.17.2.677565/2022). The researchers greatly appreciate the support of TK Harapan Bunda Jambi.

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