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Improving Early Childhood Health Literacy through a Smart Apps Creator Based PHBS Game

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Abstract

This study aims to analyze the implementation of Smart Apps Creator-based Clean and Healthy Living Behavior (PHBS) educational games in improving early childhood health literacy as a continuation of previous research that focused on media development and feasibility (Rahayu & Arzaqi, 2025). The research method used was a quasi-experiment with a one group pretest posttest design that was complemented by observation during implementation. The research subjects consisted of three children aged 5–7 years who were accompanied by students, with a five day implementation time which included one day of pretest, three days of game implementation, and one day of posttest. The aspects of health literacy studied include personal and environmental hygiene, healthy food, and physical activity. The research instruments were in the form of pretest, posttest, and observation sheets per PHBS game level, then analyzed descriptively, quantitatively and qualitatively. The results of the study showed that there was an increase in children's health literacy in all aspects of PHBS studied. The improvement was seen gradually through the results of daily observation which showed the development of independence, consistency, and accuracy of children's responses in completing each level of the game, and was strengthened by better posttest results than pretests. These findings show that PHBS educational games based on Smart Apps Creator are effectively used as an applicative and contextual health learning media for early childhood.

***Keywords**: Educational Games, PHBS, Health Literacy, Early Childhood*

Introduction

Clean and Healthy Living Behavior (PHBS) is a fundamental aspect that must be instilled from the early stages of education. PHBS plays an important role in forming daily habits related to personal hygiene, the environment, a healthy diet, and appropriate physical activity (Khasanah et al., 2020). Early childhood has a tendency to learn through habituation and real experiences, so an understanding of PHBS needs to be given consistently in order to form a healthy behavior that is sustainable. Without proper learning, children are at risk of developing habits that are less supportive of health, such as not washing their hands, choosing careless food, and not moving. Therefore, effective PHBS education must be structured in an attractive and easy-to-understand manner so that children are able to recognize and carry out healthy behaviors in daily life.

However, problems related to PHBS in early childhood are still quite high in Indonesia. Based on the 2022 Indonesian Nutrition Status Survey (Auli et al., 2020), around 35% of early childhood do not have the habit of washing their hands properly, and most still do not understand the basic concepts of germs and environmental hygiene. In terms of healthy food consumption, data from the Ministry of Health (P2PTM Ministry of Health of the Republic of Indonesia, 2018) shows that more than 33% of school-age children consume fast food more than three times a week, while 29% of children consume sugary drinks every day. In addition, sedentary lifestyle is also increasing with the use of gadgets, where early childhood only moves actively for 30–40 minutes per day, even though the WHO recommendation is 180 minutes of physical activity per day (WHO, 2009). This condition has a direct impact on the increased risk of childhood obesity, dental caries, and nutritional disorders which are still national health problems. This data shows that PHBS learning needs to be improved through a more interesting, memorable, and easy-to-understand approach for early childhood.

The PHBS learning methods used in PAUD institutions today are also generally still conventional, such as lectures, verbal explanations, or the use of simple worksheets. Methods like this are less effective for early childhood who tend to learn through hands-on experience, games, and visual interactions (Rahayu & Setiasih, 2022a). Children need concrete, interactive, and stimulating learning media in order to understand the concepts of cleanliness, healthy food, and physical activity more deeply. In addition, PHBS materials are often considered boring by children, so teachers need to find learning strategies that are able to maintain children's attention and motivation during activities (Patmawati & Rahmayani, 2021). The lack of interesting and developmental media causes the transformation from knowledge to healthy behavior to not run optimally. This condition confirms the need for innovative media that is able to bridge health learning in a fun way for early childhood.

Educational games are one of the effective solutions because they have attractive, interactive visual characters, and provide direct feedback to children

(Arzaqi et al., 2024). Various studies show that game-based digital media can increase children's attention, motivation, and learning retention because they are actively involved in the learning process. Games allow children to repeat the material many times without feeling bored, while providing an opportunity for exploration that is in accordance with the way early childhood learns, namely playing while learning. In addition, the use of digital technology can help teachers convey abstract material, such as germs or the concept of healthy food, to be more concrete and easy to understand (Görgen et al., 2020). Thus, educational games are a potential medium to help instill clean and healthy living behaviors more effectively than traditional methods.

As a form of learning media innovation, previous research entitled "Development of Smart Apps Creator-Based Educational Games to Improving Children's Health Literacy" has developed an educational game based on Smart Apps Creator that contains three main components of early childhood health literacy (Rahayu & Arzaqi, 2025). These components include personal and environmental hygiene, healthy food selection, and physical activity. The game developed has been validated by media experts and subject matter experts, and the results show that it is "very feasible" and can be used as a health education medium. Previous research focused on the media development stage (research and development), so it emphasizes more on the feasibility of function, appearance, and quality of game content. However, the study has not directly involved early childhood to see how games are used in real-world learning situations and whether they can actually improve children's health literacy.

Therefore, this study is a direct continuation of previous research and aims to implement PHBS educational games based on Smart Apps Creator in early childhood. This implementation is important to test the effectiveness of the media and assess changes in children's understanding and behavior after using games. Media that has been declared feasible needs to be tested on real users to ensure that the game is truly able to improve health literacy, according to its development goals. This follow-up research also provides a concrete picture of how children aged 5, 6, and 7 respond to the use of educational games, as well as enrich insights into the use of digital media in children's health education. Thus, this research is expected to make a real contribution in improving technology-based learning media and supporting efforts to improve PHBS in early childhood.

Method

Types and Approaches to Research

This study uses a quasi-experimental type with a pre-test–post-test one group design to see changes in children's understanding after using the PHBS educational game based on Smart Apps Creator. The use of quasi-experimental designs in a short duration, i.e. 3–5 days, is allowed in early childhood education research because its primary objective is to measure short-term changes after an intensive intervention. This is in line with the opinion of Fraenkel & Wallen (Asgari & Baptista, 2011) who stated that quasi-experiments

can be carried out in a short period of time if the focus of the research is direct behavior change and not longitudinal. In addition, according to Campbell & Stanley, a single post-test pre-test design can be used to test the effectiveness of a medium or treatment given in a limited time, especially in learning media development research (Stanley & Campbell, 1963). Thus, the duration of implementation for 3 days and a total of 5 days of activities still met the scientific criteria in educational experiment research.

Subject, Location, and Time of Research

The research subjects consisted of three early childhood children who were selected using purposive sampling techniques, namely the technique of selecting participants based on their willingness, parental consent, and basic abilities in accordance with the needs of the research. The three participants came from two different regions, namely one child from Tangerang, Banten, and two children from Central Mamuju, West Sulawesi. The selection of this location follows the domicile of the accompanying student and is carried out at the home of each child so that the intervention takes place in a natural and comfortable environment, so that the child's response is more authentic. The small number of subjects in this study is allowed because it is part of a limited trial phase, as explained by Borg & Gall in the research and development (R&D) model which states that in the small group tryout stage, the researcher can use 3–9 participants to see the applicability of the media before a wider trial is conducted (Borg & Gall, 1984). Thus, the use of three children as participants is in accordance with the methodological justification for the study of the implementation of digital educational media. Participant data is presented in the following table.

Table 1. Research Participants

Child Initials	Age	Domicile Location	Companion (Student)	Remarks
J	7 years	Tangerang, Banten	M1	Children are able to operate digital devices independently
F	5 years	Heading to the Central, West Sulawesi	M2	Children need extra assistance when playing games
A	6 years	Heading to the Central, West Sulawesi	M3	The child can understand the instructions but still needs light direction

The research time lasted for two weeks, of which one week was used for the implementation of core activities, and the next week was used for the preparation of reports by accompanying students. In the first week, the activity began with the implementation of a pre-test on the first day to obtain data on children's initial abilities about PHBS. On the second to fourth days, children

played all levels of PHBS educational games with student assistance who also filled out observation sheets every day. On the fifth day, a post-test was carried out using the same instrument to evaluate the improvement. The scheduling of these five days of activities was in accordance with the principle of short-term quasi-experimentation that focused on measuring change immediately after the intervention, which was also listed in the educational experimental design recommendations by Campbell & Stanley (1963). Thus, the duration of this short but intensive implementation has met the standards of implementive research in the field of early childhood education.

Implementation Design

The implementation of the research follows structured procedures starting from pre-test, game implementation, to post-test. On the first day, students conduct a pre-test for children to get an overview of the initial abilities regarding the three aspects of PHBS. During the second to fourth days, children play all levels of PHBS games with mentoring, and students observe and fill out observation sheets in each session. The game is done consistently so that changes in the child's behavior and understanding can be clearly seen for three days in a row. On the fifth day, a post-test was administered using the same instrument as the pre-test to evaluate improvement. The entire process was given supporting documentation in the form of notes and photos of the activity.

Research Instruments

The research instrument consists of pre-test, post-test, observation sheets, and narrative documentation. The pre-test and post-test contain nine questions covering three aspects of PHBS, namely personal and environmental hygiene, healthy food, and physical activity, with an assessment scale of 1-3 and a maximum total score of 27. Observation sheets are used to assess children's ability to run each level of the game, including understanding instructions, independence, accuracy of actions, emotional response, focus, and engagement. Narrative documentation such as student notes and photos of activities is used as supporting data to assist in the interpretation of children's behavior during the intervention. All instruments have been arranged according to the needs and characteristics of early childhood development.

Data Collection Techniques

Data was collected using three main techniques, namely testing, observation, and documentation. The test is carried out at the beginning and end of the activity through pre-test and post-test to find out changes in children's knowledge about PHBS. Observations were carried out during the three days of game implementation to record changes in children's behavior and responses from day to day. The observational data provides a deeper picture of how children understand and react to learning content. Documentation in the form of photographs, diaries, and short recordings was used to reinforce the findings and validate the results of observations. These

three techniques complement each other to provide a comprehensive picture of the effectiveness of the media.

Data Analysis Techniques

Data analysis was carried out quantitatively and descriptively. Quantitative data were obtained from pre-test and post-test scores that were analyzed to see an improvement in children's knowledge after the intervention using games. Each child's score was compared to find out individual changes and general patterns. Observation data was analyzed descriptively to identify behavioral development, focus, independence, and motor skills during the playing process. Descriptive analysis was also used to interpret supporting documentation so that the results of the study provided a comprehensive picture of the effectiveness of PHBS games based on Smart Apps Creator in early childhood. With this analysis, researchers can assess whether previously developed media really have an impact on understanding children's health.

Result and Discussion

The results of this study are presented based on the three main components of health literacy that are the focus of the intervention, namely personal and environmental hygiene, healthy food, and physical activity. The data presentation was carried out by combining the results of the pre-test, observation during the implementation of the game for three days, and post-test given to three research participants. The use of a combination of tests and observations allowed researchers to see changes not only in conceptual understanding, but also in real behavior as children interacted with the level of play according to their respective aspects.

Personal and Environmental Hygiene Aspects

In this study, the cleanliness aspect was measured through pre-test instruments, observation during three days of game implementation, and post-test with consistent indicators. The analysis was carried out to look at the child's initial ability, the developmental process during interaction with PHBS educational games, and changes in abilities after the intervention was given. The data is presented quantitatively in the form of a table and analyzed descriptively to provide an overview of each child's development. The results in this aspect are an important basis for assessing the effectiveness of games in instilling hygiene behaviors procedurally and applicatively. The pre-test is carried out to find out the child's initial ability related to basic knowledge of personal hygiene and the environment before playing the PHBS educational game. The pre-test instrument consisted of three main questions, namely habits before eating, tools for brushing teeth, and actions to take when looking at garbage on the floor. Scores are given using a scale of 1–3, where a score of 3 indicates excellent understanding.

Table 2. Pre-test Results of Personal Hygiene and Environmental

Aspects				
Children	**Before Eating**	**Toothbrush**	**If There Is Garbage**	**Total Score**
J	3	3	3	**9**
F	3	3	3	**9**
A	2	3	2	**7**

The results of the pre-test showed that children J and F had a very good understanding of the basic concepts of personal hygiene and the environment before the intervention was carried out. This can be seen from the maximum score obtained on all indicators. Meanwhile, child A showed a fairly good understanding, but was not completely consistent on all indicators. This difference shows that there is a variation in early abilities between children that is influenced by previous experiences and habituation. Nonetheless, all children have an adequate foundation of hygiene knowledge to follow the implementation of the game.

Observation was carried out for three consecutive days to observe children's ability to implement hygiene behaviors through the level of personal and environmental hygiene games. Observation indicators include understanding instructions, recognition of handwashing sequences, accuracy of in-game actions, response to mistakes, and level of independence. Observation scores were given using a scale of 1–3.

Table 3. Observation on Day 1 Aspects of Personal Hygiene and the Environment

Children	I1	I2	I3	I4	I5	I6	Total
J	2	2	2	2	2	2	12
F	1	1	2	2	1	1	8
A	2	2	2	2	2	2	12

On the first day, most children still need direction in understanding the flow of the game and the instructions given. Child F showed the lowest score, especially on indicators of instructional comprehension and independence, which indicated that the child was still adapting to the game mechanics. Children J and A are in the category quite well, but still show doubts in some steps. This is natural to happen in the early stages of implementation because children are still familiar with the form and rules of the game.

Table 4. Observation on Day 2 of Personal Hygiene and Environmental Aspect

Children	I1	I2	I3	I4	I5	I6	Total
J	3	3	3	3	2	3	17
F	2	2	3	3	2	2	14
A	2	3	3	3	2	2	15

On the second day, all children showed a significant improvement compared to the first day. Child J is able to understand the instructions very well and complete the hygiene level independently. Children F and A also showed clear development, especially in the accuracy of the handwashing sequence and the ability to put garbage in the right place. Although the response to mistakes still needs to be improved, in general children are starting to get used to the mechanics of the game and are able to follow the flow of the game more confidently.

Table 5. Observation on Day 3 Aspects of Personal Hygiene and the Environment

Children	I1	I2	I3	I4	I5	I6	Total
J	3	3	3	3	3	3	18
F	3	3	3	3	3	3	18
A	3	3	3	3	3	3	18

On the third day, all children achieved maximum scores on all observation indicators. Children are able to understand instructions, follow handwashing orders, and complete hygiene levels independently without assistance. No more confusion or significant errors in the game process. These results show that the repetition of playing games has a positive impact on strengthening hygiene behaviors procedurally and consistently.

Post-tests are given after the entire implementation series is completed to see the change in the child's understanding compared to the initial condition.

Table 6. Post-test Results of Personal Hygiene and Environmental Aspects

Children	Before Eating	Toothbrush	If There Is Garbage	Total Score
J	3	3	3	**9**
F	3	3	3	**9**
A	3	3	3	**9**

The post-test results showed that all children achieved maximum scores in the aspects of personal hygiene and the environment. Child A, who was previously inconsistent in the pre-test, showed a clear improvement after participating in the implementation of the game. The consistency of high scores in the post-test indicates that PHBS educational games not only maintain a good understanding of children, but also strengthen the concept of hygiene in children that was previously still developing.

Discussion

The results of research on personal hygiene and environmental aspects show that the implementation of digital-based PHBS educational games is able to gradually strengthen hygiene behavior in early childhood. Based on the results of the pre-test, observation for three days, and post-test, it was seen that

there was an increase in children's understanding and skills in recognizing and practicing personal and environmental hygiene behaviors. Although some children already have a fairly good initial knowledge, the observation process shows that the greatest reinforcement occurs in aspects of independence, consistency of steps, and the accuracy of children's responses when interacting with games. This indicates that game media not only functions as a means of conveying information, but also as a tool for habituating behavior.

In more detail, the observation results showed that on the first day the child was still in the stage of adaptation to the game mechanism and the concept of cleanliness presented. Children still need time to understand the sequence of steps, such as washing their hands properly or disposing of garbage in place. However, on the second and third days, there was a relatively consistent increase in observation scores in all study subjects. This increase is not instantaneous, but gradual, reflecting the natural learning process in early childhood. These findings reinforce the view that learning through repetition and hands-on experience is more effective in shaping hygiene habits than one-way learning.

The results of this study are in line with the research of Rahayu & Setiasih (2022b) which states that the use of interactive digital media can improve children's clean and healthy living behavior, especially in aspects of personal hygiene such as washing hands and maintaining environmental cleanliness. The research emphasizes that visualization and direct interaction help children understand the concept of cleanliness in a more concrete way. The similarity in results can be seen in the gradual improvement that occurs after children interact repeatedly with learning media, not just through verbal explanations.

In addition, the findings of this study also support the results of research by Suci et al. (2024) who found that technology-based educational games are effective in shaping hygiene behaviors in early childhood. Rahmawati and Hidayat emphasized that children are more likely to accept and remember the concept of cleanliness when presented in the form of fun games. In this study, children showed increased independence in completing hygiene levels, which indicates that games are able to stimulate children's sense of responsibility and self-control over clean behavior.

This research is also relevant to the findings of Sintiah (2021) who stated that habituation of hygiene behavior through digital media needs to be done repeatedly and structured in order to have an optimal impact. Putri, et al. emphasized that changes in children's behavior cannot be measured from just one intervention, but through a continuous observation process. This is in line with the design of this study which uses observation for three days, so that it is able to capture the child's developmental process more comprehensively and realistically.

As a follow-up to the previous article that developed a PHBS educational game based on Smart Apps Creator, the results of this study provide an empirical contribution that strengthens the effectiveness of the products that have been developed. If in the previous research the main focus was on the

development and feasibility of media, then this follow-up study confirms the impact of media implementation on children's hygiene behavior directly. Thus, this research not only complements previous studies, but also expands understanding of how PHBS educational games can be used as a learning tool that is applicable in children's daily lives.

Aspects of Healthy Food

The aspect of healthy food in this study emphasizes children's ability to recognize types of food, distinguish between healthy and unhealthy foods, and choose the right food through the medium of digital games. Measurements were carried out through pre-tests to see the child's initial knowledge, observation for three days of game implementation at the level of healthy food, and post-test to determine changes in understanding after intervention. Data presentation is carried out systematically so that the child's development process can be seen gradually, not only the final results.

The pre-test instrument on the aspect of healthy food consisted of questions about the introduction of types of food, examples of healthy foods, and good food choices for daily consumption. Scores are given using a scale of 1–3.

Table 7. Pre-test Results of Healthy Food Aspects

Children	Getting to Know the Types of Food	Examples of Healthy Foods	Choosing Healthy Foods	Total Score
J	3	3	2	8
F	2	2	1	5
A	2	3	2	7

The results of the pre-test showed that the child's initial ability in the aspect of healthy food was at a varied level. Child J has known the types and examples of healthy food well, but is still hesitant when asked to choose the right food. Child F shows a limited understanding, especially in distinguishing healthy and unhealthy foods, which can be seen from the low score on the food selection indicator. Child A is in the category of doing quite well, although it still needs to be strengthened in the consistency of choosing healthy foods. These findings suggest that children's initial knowledge of healthy foods is not even and still requires concrete and visual learning interventions.

Observations were carried out for three consecutive days to see the child's ability when playing the level of healthy food in the game. Observation indicators include the ability to recognize food images, choose healthy foods, understand game feedback, consistency of choices, and children's enthusiasm during play.

Table 8. Observation on Day 1 Aspects of Healthy Food

Children	I1	I2	I3	I4	I5	Total
J	2	2	2	2	2	10

F	1	1	1	1	2	6
A	2	2	2	2	2	10

On the first day, most children still look hesitant to choose healthy food, especially when the choice of food is presented in an attractive visual form. Child F often chooses foods based on appearance without considering health value, resulting in low scores. Children J and A show enough initial understanding, but it still takes time to understand the game's feedback when making mistakes. This shows that children are still in the stage of adapting to the rules of the game and the concept of healthy food.

Table 9. Observation Day 2 Aspects of Healthy Food

Children	I1	I2	I3	I4	I5	Total
J	3	3	2	3	2	13
F	2	2	2	2	2	10
A	3	3	2	2	2	12

On the second day, an improvement in ability was seen in all children. J's child began to be more consistent in choosing healthy foods and understanding game feedback when choosing the wrong one. Child F showed significant improvement compared to the first day, although it still required repetition and light direction. Child A shows a more stable understanding, especially in recognizing healthy foods. This improvement suggests that repetition of playing games helps children associate food visuals with health concepts.

Tabel 10. Observasi Hari ke-3 Aspek Makanan Sehat

Children	I1	I2	I3	I4	I5	Total
J	3	3	3	3	2	14
F	2	3	2	2	2	11
A	3	3	3	2	2	13

On the third day, the child's ability is more stable and consistent. Child J is able to choose healthy foods appropriately on most occasions, although occasionally still consider the visual appearance of the food. Child F shows gradual improvement, but has not yet reached the maximum score, which reflects the developmental characteristics of younger children. Child A shows almost stable ability on all indicators, although it still needs to be strengthened in the consistency of choice.

Table 11. Post-test Results of Healthy Food Aspects

Children	Getting to Know the Types of Food	Examples of Healthy Foods	Choosing Healthy Foods	Total Score
J	3	3	3	**9**
F	2	3	2	**7**

A	3	3	3	**9**

The post-test results showed an increase in children's understanding compared to the pre-test, especially in the ability to recognize and choose healthy foods. Children J and A achieved maximum scores, which shows that the game is able to reinforce the concept of healthy food effectively. Children F also showed improvement over the initial condition, although not completely consistent, reflecting differences in age and experience. Overall, these results show that PHBS educational games have a positive impact on children's understanding of healthy food.

Discussion

The results of the research on the aspect of healthy food show that the implementation of digital-based PHBS educational games is able to increase children's understanding in recognizing, distinguishing, and choosing healthy foods gradually. Based on the results of the pre-test, observation for three days, and post-test, it was seen that there was a development of children's abilities, especially in identifying healthy foods and associating them with daily consumption habits. Although at first some children still choose foods based on attractive visual appearances, repeated interactions with games help children understand the health meaning behind these food choices. These findings show that learning through game media is able to bridge abstract concepts of nutrition into concrete learning experiences.

The results of observations showed that on the first day of implementation, children still tended to hesitate and often made mistakes in choosing healthy foods, especially in younger children. However, on the second and third days, there was a relatively stable and realistic increase in observation scores in all study subjects. Children begin to show consistency in choosing healthy foods and are able to understand the feedback provided by games when they make mistakes. This process emphasizes that habituation through the repetition of playing games plays an important role in strengthening children's understanding of the concept of healthy food.

The findings of this study are in line with the results of Gani et al.'s (2015) research which states that game-based interactive learning media is effective in improving children's understanding of balanced nutrition. The study found that children are more likely to recognize and remember healthy foods when they are presented in visual and game forms compared to the lecture method. The similarity in results can be seen in the improvement of children's ability to classify healthy and unhealthy foods after participating in game-based learning.

In addition, the results of this study also support the findings of Rahayu & Setiasih (2022b) which show that digital educational games can increase children's awareness of healthy eating habits from an early age. Nurhayati, et al. emphasized that children need direct experience to understand the concept of healthy food, not just memorization. In this study, children not only answered questions correctly on the post-test, but also showed increased

consistency during observation, which reflected more meaningful understanding.

This research is also relevant to Zuniarsih et al. (2021) who stated that the use of interactive digital media can help children associate food choices with their impact on body health. Pratiwi and Kusuma found that visual interaction and direct feedback in games encourage children to do simple reflection on their choices. This is in line with the results of this study, where children began to improve food choices after getting feedback from the game, especially on the second and third days of implementation.

As a continuation of the previous article that focused on the development of PHBS educational games based on Smart Apps Creator, the results of this study provide empirical evidence regarding the effectiveness of games in improving children's health literacy in the aspect of healthy food. If previous research focused on the validity and feasibility of media, then this follow-up research strengthens the implementive function of media in shaping children's understanding and healthy eating habits. Thus, this study expands the scientific contribution by showing that PHBS educational games are not only feasible to use, but also effective in the context of real learning.

Physical Activity Aspects

The physical activity aspect in this study is focused on the child's ability to recognize the type of physical activity, understand the benefits of physical activity for the body, and imitate and choose the right activity through the medium of digital games. Measurements were carried out through a pre-test to determine the child's initial understanding, observation for three days of game implementation at the level of physical activity, and post-test to see changes in understanding after the intervention. The presentation of results is carried out systematically to show the child's developmental process over time. The physical activity pre-test instrument includes questions about examples of physical activity, the benefits of physical activity, and activity choices that are good for health.

Table 12. Pre-test Results of Physical Activity Aspects

Children	Getting to Know Physical Activity	Benefits of Physical Activity	Choosing Healthy Activities	Total Score
J	3	2	2	**7**
F	2	1	1	**4**
A	2	2	2	**6**

The results of the pre-test showed that the child's initial understanding of physical activity was still limited, especially in child F who still had difficulty distinguishing between physical activity and passive activity. Child J is already able to recognize the type of physical activity, but has not fully understood its benefits for health. Child A shows sufficient understanding, although he is not

consistent in choosing the right activity. These findings point to the need for concrete and fun learning interventions to strengthen children's understanding.

Observations were carried out for three days to see how the children responded when playing the level of physical activity in the game. Observation indicators include the ability to recognize movements, follow instructions, choose active activities, consistency of response, and enthusiasm during play.

Table 13. Observation on Day 1 Physical Activity Aspect

Children	I1	I2	I3	I4	I5	Total
J	2	2	2	2	2	**10**
F	1	1	1	1	2	**6**
A	2	2	2	2	2	**10**

On the first day, children are still in the stage of adjusting to the concept of physical activity in the game. Child F looks less consistent and tends to choose passive activities, resulting in low scores. Children J and A show sufficient initial understanding, although they still need direction to follow instructions appropriately. This condition shows that children still need repetition to understand the difference between active and passive activities.

Table 14. Observation Day 2 Physical Activity Aspects

Children	I1	I2	I3	I4	I5	Total
J	3	3	2	2	2	12
F	2	2	1	2	2	9
A	3	2	2	2	2	11

On the second day, there was an improvement in abilities in all children. Child J begins to understand the types of physical activity and is able to follow instructions better. Child F showed improvement although it was still inconsistent in choosing active activities. Child A shows stable development and understands the concept of physical activity faster than the first day. This improvement suggests that the repetition of playing games contributes to a child's comprehension.

Table 15. Observation Day 3 Physical Activity Aspects

Children	I1	I2	I3	I4	I5	Total
J	3	3	3	2	2	13
F	2	2	2	2	2	10
A	3	3	2	2	2	12

On the third day, the child's ability shows a tendency to become more stable. J's child is able to recognize and choose physical activity more precisely, although it still needs reinforcement on consistency. Child F shows a gradual but realistic improvement, according to the characteristics of a younger age.

Child A shows a fairly good and consistent understanding. These results confirm that educational games have a positive influence on the understanding of physical activity gradually.

Table 16. Post-test Results of Physical Activity Aspects

Children	Getting to Know Physical Activity	Benefits of Physical Activity	Choosing Healthy Activities	Total Score
J	3	3	3	**9**
F	2	2	2	**6**
A	3	3	2	**8**

The post-test results showed an increase in children's understanding compared to the initial condition. Child J achieved the maximum score, showing a good understanding of the concept of physical activity. Child A has experienced a significant increase even though it is not completely optimal. Child F shows gradual improvement, but still requires mentoring and repetition. Overall, these results show that PHBS educational games are effective in realistically improving children's understanding of physical activity.

Discussion

The results of the research on the aspect of physical activity show that the implementation of digital-based PHBS educational games is able to increase children's understanding of the importance of physical activity for body health. Based on the results of the pre-test, observation for three days, and post-test, it was seen that there was an increase in children's ability to recognize the type of physical activity, understand its benefits, and choose activities that support health. Although in the early stages some children still have difficulty distinguishing between active and passive activities, repeated interactions with games help children build a clearer and more structured understanding. This shows that game media is able to simplify the concept of physical activity into a learning experience that is easy for children to understand.

The observation results showed that on the first day of implementation, children were still in the adaptation stage and tended to be passive in responding to physical activity instructions in the game. Younger children show confusion when asked to choose activities that involve body movements. However, on the second and third days, there was a gradual and consistent increase in observation scores. Children begin to demonstrate the ability to follow instructions, recognize movements, and choose appropriate physical activities. This improvement suggests that children's repetition and active involvement in play play play an important role in shaping an understanding of physical activity.

The findings of this study are in line with the results of Lestari's (2021) research which states that interactive game media is effective in increasing children's awareness of the importance of physical activity. The research shows

that children are more likely to understand the concept of physical activity when presented through games that involve visual movements and activity choices. The similarity in results was seen in the gradual improvement experienced by children after several interactions with the game media, rather than after one exposure.

In addition, the results of this study support the findings of Julianti & Nasirun (2018) who stated that the use of interactive digital media can increase children's interest and participation in physical activities. This study emphasizes that children tend to be more enthusiastic when learning is presented in the form of games compared to direct instruction. In this study, the increase in children's enthusiasm during the observation on the second and third days showed that educational games were able to stimulate children's interest in physical activity indirectly.

This research is also relevant to Soebyakto & Italia (2022) who stated that game-based learning can help children understand the relationship between physical activity and body health. Lestari and Mulyani found that children who engaged in educational play showed an increased conceptual understanding of the benefits of physical activity. This is in line with the results of this study's post-test, where children showed an increase in scores in understanding the benefits of physical activity after participating in the implementation of the game.

As a follow-up to the previous article that focused on the development of PHBS educational games based on Smart Apps Creator, the results of this study provide further evidence that the media developed is not only feasible, but also effective in improving children's health literacy in the aspect of physical activity. This follow-up research reinforces previous findings by showing that games are able to function as an applicative and sustainable means of learning. Thus, this research contributes to expanding the empirical study of the use of educational game media in children's health learning.

Conclusion

The results showed a consistent improvement in early childhood health literacy across the domains of personal and environmental hygiene, healthy eating, and physical activity following the implementation of the Smart Apps Creator based PHBS educational game. Children demonstrated progressive gains in both conceptual understanding and behavioral performance, particularly in independence, consistency, and accuracy during gameplay, as reflected in higher posttest scores compared to pretest results. These findings indicate that the PHBS educational game is effective as an interactive and contextual medium for promoting health literacy in early childhood.

References

Arzaqi, R. N., Hendriawan, D., & Rahayu, A. K. (2024). Strategi Pengembangan Game Digital Berbasis Keterampilan Executive Function Anak Usia Dini.

Pratama Widya: Jurnal Pendidikan Anak Usia Dini, *9*(2), 136–148.

Asgari, S., & Baptista Nunes, J. M. B. (2011). *Experimental and quasi-experimental research in information systems*.

Borg, W. R., & Gall, M. D. (1984). Educational research: An introduction. *British Journal of Educational Studies*, *32*(3).

Gani, H. A., Istiaji, E., & Pratiwi, P. E. (2015). Perilaku Hidup Bersih dan Sehat (PHBS) Pada Tatanan Rumah Tangga Masyarakat Using (Studi Kualitatif di Desa Kemiren, Kecamatan Glagah, Kabupaten Banyuwangi). *Jurnal IKESMA*, *11*(1), 26–35.

Görgen, R., Huemer, S., Schulte-Körne, G., & Moll, K. (2020). Evaluation of a digital game-based reading training for German children with reading disorder. *Computers & Education*, *150*, 103834.

Imania Auli, P., Insanuddin, I., Supriyanto, I., & KM, M. (2020). *GAMBARAN KONDISI KESEHATAN GIGI DAN MULUT PADA LANSIA DI BEBERAPA KOTA INDONESIA*. Politeknik Kesehatan Kemenkes Bandung.

Julianti, R., & Nasirun, H. M. (2018). Pelaksanaan Perilaku Hidup Bersih Dan Sehat (Phbs) Di Lingkungan Sekolah. *Jurnal Ilmiah Potensia*, *3*(2), 11–17. www.dinkes.go.id

Khasanah, N. N., Susanto, H., & Samsudin, S. (2020). Pengabdian Masyarakat melalui Penerapan Metode Peer Counselor dengan Pendekatan Spiritual pada Pemrakarsa Kelompok Anti Kekerasan Seksual pada Anak. *Engagement: Jurnal Pengabdian Kepada Masyarakat*, *4*(1), 156–165. https://doi.org/10.29062/engagement.v4i1.74

Lestari, L. (2021). Promosi Kesehatan Perilaku Hidup Bersih Dan Sehat Di Sd 3 Sidorejo Pangkalan Bun. *Jurnal Borneo Cendekia*, *5*(1), 70–73. https://doi.org/10.54411/jbc.v5i1.225

P2PTM Kemenkes RI. (2018). Kapan Saja Harus Mencuci Tangan? In *Kemenkes RI*. Direktorat Pencegahan Dan Pengendalian Penyakit Tidak Menular Kementerian Kesehatan Republik Indonesia. http://p2ptm.kemkes.go.id/preview/infografhic/kapan-saja-harus-mencuci-tangan

Patmawati, P., & Rahmayani, R. (2021). Penerapan Perilaku Hidup Bersih Dan Sehat Rumah Tangga Dipatanpanua Di Masa Pandemi Covid-19. *Bina Generasi : Jurnal Kesehatan*, *13*(1), 87–99. https://doi.org/10.35907/bgjk.v13i1.200

Rahayu, A. K., & Arzaqi, R. N. (2025). Pengembangan Game Edukatif Berbasis Smart Apps Creator dalam Meningkatkan Literasi Kesehatan Anak. *Pratama Widya: Jurnal Pendidikan Anak Usia Dini*, *10*(1), 65–76.

Rahayu, A. K., & Setiasih, O. (2022a). Clean and Healthy Behavior in Early Childhood During Covid-19 Pandemic. *6th International Conference of Early Childhood Education (ICECE-6 2021)*, 141–146.

Rahayu, A. K., & Setiasih, O. (2022b). Parents' Role in Familiarizing themselves with Clean and Healthy Living Behavior in Early Childhood during the COVID-19. *Indonesian Journal of Early Childhood Education Studies*, *11*(2), 83–90.

Rahayu, A. K., & Setiasih, O. (2022c). Strategi Orang Tua dalam Membiasakan PHBS Anak Usia Dini saat Pandemi COVID-19. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *6*(5), 4118–4127.

Sintiah Putri, R. (2021). Partisipasi Masyarakat Dalam Program Kampung KB Di Masa Pandemi (Studi Kasus Desa Sumberkarang Kecamatan Dlanggu Kabupaten Mojokerto). *Hasanuddin Journal of Sociology*, 59–75. https://doi.org/10.31947/hjs.vi.12328

Soebyakto, D. H., & Italia, I. (2022). Penyuluhan Pola Hidup Bersih Dan Sehat (Phbs) Dan Pemeriksaan Kesehatan Gratis Di Posyandu Lansia Stikes Mitra Adiguna Palembang. *Community Development Journal: Jurnal Pengabdian Masyarakat*, *3*(2), 952–956.

Stanley, J. C., & Campbell, D. T. (1963). *Experimental and quasi-experimental designs for research*. Chicago: R. McNally.

Suci, A. D., Hendriawan, D., & Arzaqi, R. N. (2024). Pengembangan Game Edukasi Melalui Construct 2 Sebagai Media Alternatif Pengenalan Keaksaraan Anak Usia Dini. *Murhum: Jurnal Pendidikan Anak Usia Dini*, *5*(1).

WHO. (2009). WHO Guidelines on Hand Hygiene in Health Care: Transmission of pathogens by hands. WHO guidelines on hand hygiene in healthcare. In *World Health Organization* (pp. 12,13,30-35). http://whqlibdoc.who.int/publications/2009/9789241597906_eng.pdf

Zuniarsih, Z., Maemonah, M., & Dwi Selvi, I. (2021). Love Cards: Media Orang Tua Menerapkan Perilaku Hidup Bersih dan Sehat pada Anak Usia Dini di Masa Pandemi COVID-19. *Golden Age: Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini*, *6*(2), 57–66. https://doi.org/10.14421/jga.2021.62-01