



EFFECTIVENESS OF PHBS ANDROID EDUCATIONAL GAMES ON CLEAN AND HEALTHY LIVING BEHAVIORS IN PRIMARY SCHOOL CHILDREN IN THE COASTAL AREA OF BENGKULU CITY

Reka Lagora Marsofely^{a*} ; Wisuda Andeka Marleni^b ; Sri Widiyati^c ; Fajar Surahmi^d

^{a, b} Poltekkes Kemenkes Bengkulu; Indra Giri 03 Padang Harapan ; Bengkulu 38225; Indonesia

^{c, d} Poltekkes Kemenkes Semarang ; Tirta Agung Pedalangan Banyumanik; Semarang 50275; Indonesia

Abstract

School-aged children are a strategic or appropriate target for implementing health programs because apart from being large in number, they are also a target that is easy to reach and can be well organized. The high level of student ignorance regarding clean and healthy living behavior (PHBS) is still due to environmental factors, influence from peers, and educational patterns provided by parents. One way to increase children's knowledge is by providing education using a method that children like, namely through games. This research aims to determine the effectiveness of educational games on knowledge and attitudes about PHBS among elementary school children in the coastal area of Bengkulu City. This type of research used a quantitative method with quasi experimental design two group pretest posttest. The sample was taken from 70 people using a simple random sampling technique. Data were analyzed using the paired T-Test. The results of statistical tests show that there is an increase in average knowledge after providing educational game intervention ($p=0.000$, $t= -5.111$, one tail) and there was an increase in average attitude after providing the educational game intervention ($p=0.000$, $t=-1.548$, one tail). The intervention was effective in knowledge and attitudes about PHBS among elementary school children in the coastal area of Bengkulu city. It is hoped that this research can be used as a medium to increase knowledge and attitudes towards implementing PHBS in children..

Keywords: *Edugame PHBS; Knowledge; Attitude; Child*

1. Introduction

Clean and healthy living behavior (PHBS) is something that people should implement in everyday life as a way to maintain their health. WHO (2017) says that every year 100,000 Indonesian children die from diarrhea, the number of worms reaches 40-60%, anemia in school children is 23.2% and caries problems are 74.4%. The national target for educational institutions implementing PHBS in 2019 is 70%. (Directorate of Health Promotion and Community Empowerment, 2016)

Bengkulu City is a coastal area. Several health aspects that are a problem in coastal areas are environmental health, infant and toddler health as well as maternity health and family planning. Environmental health includes housing, water sources, garbage, feces, and wastewater disposal. The results of the 2019 Bengkulu City Health Office PHBS introspective survey showed that the Beringin Raya Community Health Center work area was the community health center with the lowest percentage of residents who had washed their hands with soap (47%) compared to other community health centers. This data is still far from the government's target which must be achieved in the year with a percentage of 100%.

*) Corresponding Author (Reka Lagora Marsofely) Email : reka@poltekkesbengkulu.ac.id

The low achievement of PHBS indicators in households and schools contributes to an increase in health problems for children because children's

health is greatly influenced by the environment and the behavior of the people around them.

Children are the group most vulnerable to disease. Diseases that often arise due to low PHBS include worms, diarrhea, toothache, skin disease, poor nutrition, and so on (Raksanagara, et al., 2015). This will affect the child's growth and development and the quality of his health.

Several elementary schools in coastal areas are SDN 68 and SDN 85 in Bengkulu City. Based on the results of the initial survey conducted by researchers, several children ate but did not wash their hands. Even though the elementary school has facilities that are very supportive of implementing PHBS in the school setting. However, based on the results of interviews with elementary school students, they do not know PHBS well.

The high level of student ignorance regarding PHBS is still caused by environmental factors, influence from peers, and educational patterns provided by parents. One way to increase children's knowledge is by providing education using a method that children like, namely through games. A.V. Vitianingsih, 2016 states that educational games are a very fun activity and can be an educational method or tool that is educational in nature. Research by Rahman RA and Tresnawati, 2016 Educational games accompanied by attractive designs, animations, and color variations make them interesting to use for children at an early age.

The results of previous research have designed an Android-based PHBS Edugame using the ADDIE Model approach and it was declared suitable for use by elementary school children. The results of statistical tests show that there is an influence of game on knowledge ($p=0.000$) and attitudes ($p=0.000$) about PHBS among children at SDIT Al-Hasanah, Bengkulu City (Marsofely, Setiawan, 2021). In this study, researchers wanted to find out the effectiveness of the previously designed PHBS Android Game compared to the educational game Let's Prevent Existing Viruses which is a game about PHBS in the play store, this game is similar to the PHBS game that has been developed by researchers on knowledge and attitudes about PHBS in Elementary School Children in the Coastal Area of Bengkulu City. This research has never been carried out before because the game media used is media that was designed by researchers and has been tested for feasibility. This research aims to determine the effectiveness of PHBS educational games on knowledge, attitudes, and behavior about PHBS in elementary school children.

2. Method

This research uses quantitative methods by designing quasi-experimental pre and post-tests with a control group design. This research was conducted in the working area of the Beringin Raya Community Health Center, namely SD 68 and SD 85. The population in this research was students from SDN 68 and SD 85, Bengkulu City, totaling 1051 students. The sample was calculated using a different mean formula to obtain 70 samples, technique the sampling used in this research was proportional stratified random sample and carried out randomly which were divided into 2 groups, the first group contained 35 people who were given the PHBS Edugame Media (intervention group) and the second group contained 35 people who were given the game media Let's prevent viruses (control group). Sampling was done using simple random sampling. Data analysis used the paired t-test. The research stages start with managing research ethics and being declared ethically appropriate based on letter No. KEPK.BKL/268/05/2023.

3. Result and Discussion

Table 1 Frequency Distribution Characteristics of Respondents Based on Age and Gender

| Characteristics | Intervention | | Control | | Total | |
|-----------------|--------------|-----|---------|------|-------|------|
| | (n) | (%) | (n) | (%) | (n) | (%) |
| Age | | | | | | |
| 10 years | 14 | 40 | 23 | 65,7 | 37 | 52,8 |
| 11 years old | 21 | 60 | 12 | 34,3 | 33 | 47,2 |
| Gender | | | | | | |
| Female | 21 | 60 | 11 | 31,4 | 32 | 45,7 |
| Male | 14 | 40 | 24 | 68,6 | 38 | 54,3 |

Based on Table 1, it shows the sample distribution that most of the children are aged 10 years old (52.8%), and most of the children were boys (54.3%).

Table 2. Average distribution of respondents' knowledge before and after the Edugame PHBS intervention and Control Group Let's prevent viruses

| Variable | Pre-test | Post-test |
|------------------------------|------------|------------|
| | Mean±SD | Mean±SD |
| Intervention group knowledge | 6.714±2.02 | 8.514±1.46 |
| Control group knowledge | 6.171±2.20 | 8.085±1.96 |

The results of statistical tests show that there is an increase in average knowledge after giving the PHBS game intervention to children ($p=0.000$, $t= -5.111$, *one tail*), and there was an increase in average knowledge after giving the Let's Prevent Viruses game intervention to children ($p=0.000$, $t= -5.732$, *one tail*).

Table 3. Average distribution of respondents' attitudes before and after in intervention and control groups

| Variable | Pre-test | Post-test |
|-------------------------------------|------------|------------|
| | Mean±SD | Mean±SD |
| Attitudes of the intervention group | 32.17±2.02 | 32.80±1.46 |
| Control group attitudes | 33.25±3.34 | 34.11±3.28 |

The results of statistical tests show that there is an increase in average attitude after providing the intervention Game PHBS in Children ($p=0,000$, $t= -1.548$, *one tail*). The results of statistical tests show that there is an increase in average attitude after providing the intervention *let's prevent viruses* in children ($p=0,000$, $t= -1.516$, *one tail*).

Table 4. Effectiveness of PHBS game interventions and Game let's prevent viruses

| Variable | | Sum of Squares | df | Mean Square | F | p value |
|--|----------------|----------------|----|-------------|-------|---------|
| PHBS game intervention | Between Groups | 36.826 | 20 | 1.841 | 0.718 | 0.000 |
| | Within Groups | 35.917 | 14 | 2.565 | | |
| Control group Game Let's prevent viruses | Between Groups | 68.826 | 20 | 3.441 | 0.778 | 0.000 |
| | Within Groups | 61.917 | 14 | 4.423 | | |

The results of statistical tests show that there is an increase in average knowledge after giving PHBS game intervention to children ($p=0.000$). and there was an increase in average attitude after giving PHBS

game intervention to children ($p=0.000$).

Discussion

The research results showed that the sample distribution showed that most of the children were aged 10 years old (52.8%), and most of the children were boys (54.3%). The results of this study are the same with the research of Yunita, Hidayat R (2017) application of educational games for children aged 5 to 10 years using the image manipulation method. The results of this research are in line with Felicia (2011), who found that the average tendency to play games was 46.68 for boys, while for girls it was 40.28. Other studies show that more men are playing *game online* compared to women. Boys develop an interest in computer games at a younger age, while girls become interested in playing games when they are older (A.V. Vitianingsih, 2016).

The results of statistical tests show that there is an increase in average knowledge after giving the PHBS game intervention to children ($p=0.000$, $t= -5.111$, one tail), and there was an increase in average knowledge after giving the Let's Prevent Viruses game intervention to children ($p=0.000$, $t= -5.732$, one tail). The above results are in line with Arfiani, Effendi, 2020 (2019) which explains there was a significant difference in the knowledge scores before and after being given Android-based educational games on the knowledge and adventure attitudes of pious children, in the intervention group ($p<0,005$).

Marsofely, setiawan (2023) research results, stated that there was an influence of developing Android-based educational games on a significant increase in cognitive knowledge before and after using Android applications. Like wise Nugraha, A., & Hertanto, D. B. (2017). stated that there was an influence from the use of educational game media on the science learning outcomes of fourth-grade students at Kajartengguli Prambon Sidoarjo Elementary School, which could be seen from the probability value of 0.027 ($p<0.05$). Rusdiyana, 2019 research results also stated that educational games were able to increase knowledge about food and healthy lifestyles, including consumption of vegetables and fruit.

Setiawan, Y., Arismunandar, M. A., & Andreswari, D. (2018) educational games are digital games designed for educational enrichment (supporting teaching and learning). The results of this research show that the results of student questionnaire testing data show that the game application built is included in the "Very Good" category with the average result obtained being 96%.

Android smartphone games that are developed as digital educational games can contain features that have the potential to provide an interesting and sustainable gaming and educational experience because they create curiosity, and challenge, involve imagination, provide feedback, and involve player involvement. The development of Android-based educational game media has two basic emphases on educational theory, namely behaviorist and cognitive education theory. Apart from that, the advantages of this educational game media are that students are more attached and quickly understand because Android digital games can stimulate all of students' five senses because in-game media there are elements of text, images, sound, animation, and interactivity. (Nugraha, A., & Hertanto, D. B. 2017).

The creation of games about clean and healthy living behavior is adapted to childhood age so that children are more interested and active in the game and it is also easier for them to understand the types of health behavior that can be carried out in everyday life.

The results of statistical tests show that there is an increase in average attitude after providing the intervention PHBS in Children ($p=0,000$, $t= -1.548$, one tail). The results of statistical tests show that there is an increase in average attitude after providing the intervention to prevent viruses in children ($p=0,000$, $t= -1.516$, one tail). Attitude is a person's positive or negative belief in displaying a certain behavior. Attitudes are determined by individual beliefs regarding the consequences of displaying behavior and evaluations of these consequences.

Attitude is the strongest factor because the attitude of wanting to recover and the desire to maintain a healthy body condition will influence sufferers to control themselves in healthy behavior. Sutriyanto, Raksanagara, Wijaya, 2016, obtained results of increasing the percentage of attitudes in students in the experimental group and control group. After the intervention was carried out for the experimental group with educational game media related to choosing healthy snacks, there was an increase in students' attitudes in the good category. These results show that there is a significant influence of educational game media regarding the choice of healthy snacks on the attitudes of elementary school children in the experimental group and is directly proportional to the increase in students' knowledge.

Research by Yunita, and Hidayat R (2017), shows that there are differences in attitudes towards choosing snacks among school children in the city of Denpasar before and after being given nutrition

education through the game media in the intervention group with a p value <0.005 . The increase in students' attitudes about PHBS can be concluded due to the influence of providing health information in the form of modified games. This media is very popular with millennial children because games are one of their favorites so they don't feel bored or fed up, they even feel interested in playing it because while playing they can learn about healthy snacks.

The results of statistical tests show that there is an increase in average knowledge after giving PHBS game intervention to children ($p=0.000$, $t= -1.516$, one tail). and there was an increase in average attitude after giving PHBS game intervention to children ($p=0.000$, $t= -1.548$, one tail). PHBS games are effective in increasing children's knowledge and attitudes about PHBS. Sutriyanto, Raksanagara, Wijaya, 2016 concluded that there was an influence of providing nutrition education using educational game media on the knowledge ($p=0.0001$) and attitudes ($p=0.009$) of elementary school children in Binjai City. This means that educational media can improve elementary school children's knowledge and attitudes regarding snack selection.

Meimaharani et al (2015) explained that at the educational game development stage, several stages were carried out. The first is the character design which is the basis for coloring. The choice of basic colors will make it easy and enjoyable for students to play this game. In this 70% stage, the author created this game design using an Android emulator.

Educational games are games that are packaged to stimulate thinking power and are one way to train users (children) to improve their concentration. Utilizing educational game technology in the teaching and learning process of children is one of the right ways, because Educational games as visual media have advantages compared to other visual media. Apart from that, educational games invite players to participate and take part in determining the final outcome of the game (Rahman and Tresnawati, 2016).

4. Summary

The intervention was effective in knowledge and attitudes about PHBS among elementary school children in the coastal area of Bengkulu city. It is hoped that this research can be used as a medium to increase knowledge and attitudes towards implementing PHBS in children

5. Acknowledgments

The author would like to express thanks to the Ministry of Health of the Republic of Indonesia, and Poltekkes Kemenkes Bengkulu for their support so that this research can be completed.

6. References

- Arfiani, Effendi, 2020, Perancangan Prototype Game edukasi Petualangan anak sholeh, ScientiCO, Computer Science and Informatics Journal Vol.3,N0.1
- A.V. Vitianingsih. (2016). Game Edukasi Sebagai Media Pembelajaran PAUD. *Jurnal INFORM*, 1(1), 25–32
- Dinas Kesehatan Kota Bengkulu (2020), *profil kesehatan kota Bengkulu*. Bengkulu
- Direktorat Promosi Kesehatan dan pemberdayaan masyarakat (2016) , pedoman PHBS, *Kementerian Kesehatan RI*
- Felicia, P. (2011, March). *What evidence is there that digital games can be better than traditional methods to motivate and teach students?* Retrieved May 2020, from http://linked.eun.org/c/document_library/get_file?p_l_id=17135&folderId=23949&name=DLFE-750.pdf
- Marsofely, Setiawan. (2023) Bagaimana Pembelajaran Edugame Perilaku Hidup Bersih dan Sehat (PHBS)mempengaruhi perubahan sikap dan perilaku siswa. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, Volume 7 Issue 3 (2023) Pages 3468-3476, <https://DOI: 10.31004/obsesi.v7i3.3443>
- Meimaharani, R., & Listyorini, T. (2015). Purwarupa Game Edukasi Pengenalan Warna Berbasis Android. *Systemic: Information System and Informatics Journal*, 1(2), 27–31.

<https://doi.org/10.29080/systemic.v1i2.278>

- Nugraha, A., & Hertanto, D. B. (2017). Rancang Bangun Game Edukasi Sebagai Media Pembelajaran Mata Kuliah Praktik Teknik Digital. *Jurnal Edukasi Elektro*, 1(1), 92-98. <https://journal.uny.ac.id/index.php/jee/article/view/15121>
- Rahman dan D. Tresnawati, 2016 Pengembangan Game Edukasi Pengenalan Nama Hewan dan Habitatnya Dalam 3 Bahasa Sebagai Media Pembelajaran Berbasis Multimedia. *Jurnal Algoritma*, 13(1), 184-190. <https://doi.org/10.33364/algoritma/v.13-1.184>
- Raksanagara, 2015, Perilaku Hidup Bersih dan Sehat Sebagai Determinan Kesehatan yang Penting pada Tatanan Rumah Tangga di Kota Bandung, *JSK Volume 1 No.1 2015*
- Riskesdas. (2018). Riset Kesehatan Dasar tahun 2018. Indonesia
- Rusdiyana (2019) pengaruh edukasi terhadap pengetahuan Perilaku Hidup Bersih dan Sehat siswa kelas V SDN Cindai Alus 1 Kabupaten Banjar, *Jurnal Wahana-Bio* Volume XXI Juni 2019, DOI: <http://dx.doi.org/10.20527/wb.v11i2>
- Setiawan, Y., Arismunandar, M. A., & Andreswari, D. (2018). Perancangan Game Edukasi Belajar Mengaji "Mengaji Bersama Budi" Menggunakan Platform Android (Studi kasus: SD IT Ulul Albaab). Seminar Nasional Inovasi, Teknologi Dan Aplikasi (SeNITiA)
- Sutriyanto, Raksanagara, Wijaya, 2016, Pengaruh game edukasi terhadap peningkatan pengetahuan tentang jajan sehat pada siswa, *JSK Volume 1 Nomor 4 tahun 2016*
- WHO. (2017) The World Health Report 2017: Reducing Risk, Promoting Healthy Life. Chapter 2: *Defining and Assessing Risks to Health*. Geneva; WHO, pp. 7 - 26
- Yuniva, I., & Hidayat, R. (2017). Rancangan Sistem Elektronik Learning Berbasis Open Source Untuk Mendukung Proses Knowledge Sharing. *Jurnal Teknik Komputer*, 3(2). <https://ejournal.bsi.ac.id/ejurnal/index.php/jtk/article/view/1682>