Cardiorespiratory training models based on waste utilization for elementary school students

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Abstract. The aim of this research and development was to produce a product in the form of a waste utilization model book for elementary school students so that it can provide guidance for physical education teachers in providing fun, creative and meaningful learning. This study used the Borg and Gall Research and Development (RnD) method which consisted of ten steps, the subjects in this study were students of Tanjungsari Elementary School and Blanakan Elementary School with 68 subjects. The design of the experimental study was based on one group pretest posttest design. The stages of this study were: preliminary research, experts' judgment, large group test, small group test and effectiveness test. The effectiveness test in this research was using Harvard Step Test. The results of the model effectiveness test showed that there was an increase in the use of waste for physical fitness, the pretest result was 33.57 and posttest was 36.63. From the data above, it can be concluded that there was an improvement after treatment. The results of the effectiveness test showed that the results of t-score = 7.818, df = 62 and p-value = 0.00 <0.05, which means that there were significant differences in the physical fitness of primary school students before and after the treatment. It can be concluded that the waste utilization model for physical fitness of elementary school students is effective and able to improve physical fitness.

1. Introduction
According to a survey in 2014 conducted by the Ministry of Youth and Sports, Republic of Indonesia, the percentage of 5-19 years old citizens who exercise through school is 56.06 percent. The quite high number can be the base to make schools as the medium to habituate sport. If the sports culture has been embedded in school-age children, it will make a positive impact on their lives later. If we look at developed countries like United States of America, they establish Physical Education as a program for life provision. Physical Education programs are to develop physically literate individuals who possess knowledge, skills, and self-confidence to participate in activity for a lifetime [1].

Sports in schools are packaged in a learning activity that is guided by the curriculum in Indonesia. According to the opinion of Siegrist "The environment at school has great potential to introduce and encourage a healthy lifestyle in children across all socioeconomically and ethnic borders" [2]. Through
sports in school or commonly called as physical education, it is not only expected to escalate the passion and awareness to do exercise in order to build a healthier lifestyle, but also to be the foundation of Indonesia's young generation strong characters and healthy souls.

Based on the results of observations conducted by researchers, from five elementary schools in Blanakan sub-district, 95% of physical education teachers were still fixated on the techniques of sports in providing the lesson to the students. As in the material of big ball games in the fourth grade, physical education teachers teach volleyball service techniques which is certainly not in line with the characteristics of elementary school students.

Further observations were made on the students when the learning process took place. From the observations, the researchers saw boring learning process which was due to several factors, including the lack of learning variations that the teacher gave and learning media that were interesting. Based on these observations, there are shortcomings of physical education teachers especially in modifying learning models and media. This makes the physical education learning in elementary school boring, the students are not motivated, the teachers tend to teach only the techniques of sports, and the physical education learning goals in elementary schools are not achieved.

For this problem, it is necessary to create physical education learning models that have the elements of play, economical and safety. Researchers will utilize household waste to create interesting and safe learning media for elementary school students. The selection of household waste as a material in making learning media because it is not only economical, but also have an impact on dissolving household waste, so that the waste that was previously considered to have no benefits can be recycled now into a physical education learning media. With the waste utilization, there is no more reason not to provide physical education learning in accordance with the characteristics of elementary school students due to the absence of facilities and infrastructures.

Based on these needs, researchers conducted a research to provide solutions to the lack of physical education learning models and media in by developing Cardiorespiratory Training Models Based on Waste Utilization for Elementary School Students.

1.1. Physical education in primary schools
Physical Education is an integral part of education that is carried out through activities to develop humans from cognitive, affective and psychomotor aspects. Physical education is an activity that is used as a part of learning medium, which aims to develop cognitive, affective and psychomotor domains. This is in line with Mosston who stated that Physical education is more than skills, rules of the game, or freedom to find movement [3]. Mosston's explanation illustrates that physical education is more than just learning motion skills but learning as a whole. Physical education must be able to develop attitudes and comprehensions of the values contained in physical education for the future of students, therefore physical education is considered as a fun and directed lesson.

1.2. Cardiorespiratory
Cardiorespiratory endurance is an important component of physical fitness. Cardiorespiratory is closely related to the quality of one's health. Someone who has good cardiorespiratory endurance will affect the improvement of the quality of life. The research on cardiorespiratory has been widely carried out in various countries from the perspective of education, in the context of health-related or sports which has become the goal of many researchers. Cardiorespiratory is strongly associated with lung and cardiac performance. If the cardiorespiratory endurance of the heart is low, the heart works more severe because it must maintain the physical activity that being carried out.

Cardiorespiratory exercises such as walking, running, cycling, swimming, or climbing stairs, two to four times per week with exercise intensity at a moderate level of 60-75% of the maximum heart rate or in the
heart reserve 70% can increase cardiorespiratory endurance [4]. Thus if someone wants to have good cardiorespiratory endurance, he/she should be doing physical activity at least four times a week with moderate intensity. This has been consistently associated with a lower risk of many health outcomes, such as cardiovascular disease [5].

Cardiorespiratory associated with physical fitness which is an important component in carrying out daily activities. O’malley et.al explained that PF represents the ability of an individual to perform daily activities with no excessive pain or energy expenditure [6]. studies indicate no association between aerobic ability and disease, although other studies have shown that there is a significant relationship between aerobic ability to joint health in children [7].

The level of physical fitness can be seen in daily activities, if someone gets tired easily, it means that the level of physical fitness is low. It is caused by excessive energy expenditure due to ineffective and inefficient work of the body organs. If one’s organs can work effectively and efficiently, the activity will automatically become light and not tiring.

2. Method

This study was conducted in two elementary schools in Blanakan sub district, Subang. The subjects of this study were fifth grade students in two elementary schools. The research and development of physical education learning media for physical fitness took place from February 2018 - April 2018, located in elementary schools in Blanakan Sub-district, Subang Regency, West Java. The research and development of physical education learning media uses research and development models from Borg and Gall. The approach used in this study is a qualitative and quantitative approach.

3. Results

After there were results of product development, the waste utilization model for physical fitness of the students of the elementary school examined by the experts and the revision obtained 21 items to be used in the next stage of the test.

The effectiveness of the design of the training model developed in the research was obtained from the results of the trial. Three trials were conducted on elementary school students as the way to determine the effectiveness level of the waste utilization models for physical fitness of elementary school students, which are: 1) small group trial, 2) large group trial, 3) trial by giving treatment of waste utilization model for the physical fitness of elementary school students and seeing the results of the process.

3.1. Results of small group test

The small group test phase used 20 subjects of Blanakan Elementary School students. The data obtained from the survey results in the form of questions to the subject. There were 21 questions about the easiness of model items application and 21 questions about the subjects’ interest in using these waste utilization models. Small group trial activities are carried out once, the following the results of data analysis based on the survey regarding the easiness and subjects’ interest in applying 21 model items:

| No | Assessment     | Score | Maximum Score | %  | Criteria |
|----|----------------|-------|---------------|----|----------|
| 1  | Easiness       | 300   | 420           | 71 | Good     |
| 2  | Attractiveness | 354   | 420           | 83 | Good     |

The results of the small group test on 20 elementary school students showed that 71% of students found it easy to apply model items. From these data it can be seen that 21 model items are in accordance with the
characteristics of elementary school students, meaning that they have no difficulty in carrying out physical activities with media that made from waste.

The results of the attractiveness analysis show that 83% of students were quite interested in the media that was created. It certainly increased students’ spirit in carrying out physical activities, so that it would have an impact on physical fitness. With the existence of an interesting learning media, there will be a positive impact on the learning process.

From researchers analysis result in the small group test phase, it can be concluded that 25 items of waste utilization models for physical fitness of elementary school students can be used for large group trials.

3.2. Results of large group test

Large group test was conducted to obtain empirical data on the products made. At this stage, researchers conducted a research on students in two schools that were Tanjungsari State Elementary School, in total of 38 students and Blanakan State Elementary School, in total of 30 students. The total subjects used in this large group test were 68 people.

The results of the large group test are presented in the following table:

| No | Assessment  | Score  | Maximum Score | %  | Criteria |
|----|-------------|--------|---------------|----|----------|
| 1  | Easiness    | 1239   | 1428          | 86 | Good     |
| 2  | Attractiveness | 1197  | 1428          | 83 | Good     |

The large group test results showed that 59 students or 86% were declared that it was easy to use the media from waste. This shows that the media and models developed can be used. To solve various groups. From the attractiveness assessment aspect in the large group test, 57 students or 83% liked the media and the model used.

Furthermore, the researcher carried out the effectiveness test and the data used was quantitative data. The effectiveness test in this study was conducted to obtain the data of the effectiveness level of the application of the model developed on the achievement of research objectives. The effectiveness of the model in this study uses a pre-experimental research design in the form of two group pretest-posttest design.

From the calculation results, it can be seen that the model of waste utilization for physical fitness has increased, the pretest obtained an average of 33.57 and when the posttest obtained an average of 36.63.

From the correlation coefficient results, it can be seen that before and after the treatment of waste utilization model for physical fitness is 0.968 with p-value 0.00 <0.05. It can be stated that there is a significant change between pretest and posttest.

From the results of the calculation of the significance difference test using SPSS 23, the results of t-count = 7.818, df = 62 and p-value = 0.00 <0.05, meaning that there is a significant difference before and after the treatment of the physical fitness training model for primary school students. It can be concluded that the waste utilization model for physical fitness of elementary school students is effective and able to improve physical fitness.

To be more explicit and simple, the following diagram shows a comparison of the average physical fitness test before and after treatment.
From diagram above, it can be concluded that the waste utilization learning media for elementary school students can improve physical fitness.

4. Discussion

The final product of the waste utilization model for physical fitness of elementary school students after the research has completed is in the form of a waste utilization model book for physical fitness for elementary school students which is considered to be able to provide guidance for the learning process in elementary school, especially regarding the games for elementary school physical fitness. From the needs analysis results of three elementary schools in Blanakan sub-district, researchers found that there was no eagerness of physical education teachers to modify the media and the learning process to improve the learning quality. Various research works and practitioners conclude that media pedagogy should be integrated in teacher education in order to enable future teachers to use media for their lessons effectively and successfully [8].

The objective of making this model is to increase the physical fitness of elementary school students which is arranged through fun games and interesting media utilization. The utilization of waste as learning media is seem to be more economical and practical. This is certainly the answer to the inadequate learning media in elementary schools. Moreover, the product that the researcher developed focuses on students’ fitness, because physical fitness is considered as an asset in order to undertake the daily activities well. A research that conducted by Lobstain et.al shows that there has been a decline in physical fitness and an increase in obesity rates in the past few decades in various countries [9]. This certainly must be regenerated since childhood, so that sport becomes a habit when they grow up. The types of physical activity that can be carried out by children were first established by the American College of Sports Medicine in 1988 with the aim of optimizing bone health, muscle strength, flexibility and general health. The results of the discussion of these experts recommend to do 20-30 minutes of strenuous exercise every day. In 1994, a research at an International Consensus Conference on guidelines for physical activity for adolescents, based largely on experts opinion, set the goal of fitness training [5].

To answer the formulation of the problem in this study, researchers carried out the stages of research developed by Borg and Gall. From the results of the expert judgment there are five model items that are not feasible to use. Furthermore, from the model items that are feasible to use according to the expert in small group test and large group test, there were data obtained as follows: data from small group test cumulatively showed that the development of waste utilization models for physical fitness in elementary school students was easy to use in learning with a percentage rate of 60% and made the subjects interested in the learning media with a percentage rate of 75%. The results of the small group test showed that the criteria were sufficient and feasible to be used in the learning process, although there are still some things that can be
improved to develop the product in order to get a better response in the large group test. The results of large group test cumulatively showed that the development of waste utilization models for physical fitness from the easiness criteria obtained a response of 82% and the subjects’ interest to the model obtained a response of 72%. The response shows good criteria and there is an increase from small group test. From these results it can be concluded that the model is feasible for us.

Furthermore, from the results of the effectiveness test, it shows that the waste utilization models for physical fitness of elementary school students is effective to be applied. Thus, it is expected that this product can be a guidance for teachers in providing physical fitness material to elementary school students. The advantages of this product are as follows.

- The guidelines on waste utilization media are presented systematically and easy to understand.
- The media is attractive, economical, easy to obtain and tend to be sturdy (not easily break).
- The game that is applied is varies so the students will not easily get bored.
- The product is packed according to the characteristics of elementary school students.

This is in accordance with adiarti’s research which states that the use of waste materials and natural concrete media as learning resources needs to be implemented continuously and consistently in learning activities in order to obtain maximum results [10].

5. Conclusion

From this study it can be concluded that using waste materials in the physical education learning process makes learning more efficient and interesting and if the learning process is interesting, the students will actively move that certainly affects the improvement of cardiorespiratory abilities.

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