The Effect of Circuit Games on Increasing the Physical Fitness of Students Aged 8-12 Years

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Abstract. Circuit games are a method that can be used in the learning process within the scope of educational units with various functions and benefits. This study aims to determine whether the learning process using the circuit game method affects the physical fitness of elementary school students.This type of research is quasi-experimental research with a quantitative approach. The design used in this research is pre-test and post-test. The population in this study was 60 male students, but not all of the population that was collected in this study was used. Only 40 students were used after fulfilling the inclusion criteria. The subject inclusion criteria in this study were that the subjects had to be 8-12 years old, in grades 4.5 and grade 6, then the subjects also did not have health disorders such as heart disease, respiratory problems and so on. The subjects with class level and age were 14 grade 4 students with 9 students aged 8 years and 5 students aged 9 years, 13 students in grade 5, 5 students aged 10 years and 8 students aged 11 years , and the last subject was grade 6 students totaling 11 students, 6 students aged 11 years and 5 students aged 12 years. All subjects in this study were maleThe five tests are 50 m sprint, 20-30 second sit ups, hanging elbows bent, vertical jump and 400 m long distance running. All of these tests were based on elementary school students who were in grades 4, 5 and 6.The results of this study indicated that the process of training using circuit games had a major impact on improving the physical fitness of elementary school students. The results of this study were based on the final test in the study by obtaining an L-count score = 89,139, then this value was compared with the L-table value (df=n-1=39=0.05) to obtain 19,483. So that an L-table is obtained, thus the hypothesis in the study which states that circuit games affect the physical fitness of Muhammadiyah elementary school students in the city of Yogyakarta can be accepted.Then this research can be concluded, there is an influence of the learning process using the circuit game method to improve the physical condition of elementary school students.

Keywords: Learning Process, Circuit Games, Physical fitness, Student.

1   Introduction

A person who regularly exercises and often does physical activity every day is one of the important keys in getting high health scores and implementing a healthy lifestyle

in a human person. [1,2]. Physical activity can be interpreted as a body movement that is carried out by someone by increasing energy or strength with the main goal being to burn fat into energy in a structured and organized manner [3,4]. The value obtained by an individual through physical activity will be categorized as sufficient if a person does physical exercise through various types of sports for 30 minutes every day or at least 3-5 days a week [5–7]. The principle of activity in carrying out physical activity carried out by an individual becomes a benchmark forgetting maximum results. In realizing this, an individual really needs the BBTT principle (good, right, measurable and regular) in carrying out various physical activities both individually and in groups [8,9]. The health condition of a student is in the good category, then the student concerned has carried out physical activities according to his best abilities, a student is said to be right, if the student concerned has carried out various physical activities in stages, a student is declared measurable when the student the student concerned has carried out physical activity with the right intensity and time, and Regular means physical activity carried out by a student 3-5 times a week [10,11].

Unfortunately, physical fitness factors in children in general and students in particular at the age of 8-12 years often do not apply the BBTT principle in the learning process and practice various types of activities, so it is very easy for a child or student to experience several diseases, for example obesity becomes a problem. common in children, this impact is inseparable from the very minimal activities carried out by students both in the school environment and outside the school environment. This is in line with the results of Abarca-Gomez et al. (2017) children aged 5-19 years with a total of 124 million globally experience obesity which is very frightening and young people suffer from various types of diseases. Then it was confirmed by WHO (2010) that the typical number of obesity cases in children has increased significantly every year. The consequences of obesity among children cannot be separated from physical activity that is not well controlled and there is no internal and external motivation from the students themselves. Then added the students ate fast food and were spoiled with various types of online games [12–14].

Human nature is generally difficult to change [15]. Because human habits are always based on things that are seen as good and right according to their wishes, not needs [16]. Research result [17] proves that human habits are inseparable from unhealthy lifestyles and low self-awareness about health, for example eating more fast food and moving less, this will have an impact on being overweight and lazy to move. This situation is a matter of concern for the development of students' physical fitness [18]. Children aged 8-12 years fall into the category of upper grade elementary school students. In accordance with the provisions of the Indonesian Ministry of Education, children aged 8-9 years are in grade 4, 10-11 years are grade 5, while 11-12 years are grade 6 [19]. At this age, the quality of a child's or student's physical fitness should be in a very good and good category so that they can carry out various physical activities such as running, jumping, playing football, futsal and so on [20]. However, this is very inversely when researchers carry out observations or initial research, researchers find that 80% of children or students experience problems with physical fitness, especially psychomotor problems. Children are not given more time for a child to do activities. This is certainly not good for the health of children or students and has an impact on activities that are dominated by psychomotor aspects which are then sup-

ported by cognitive and affective aspects [21]. Then the researcher conducted an experiment with a circuit game approach to change the habits of children who are often inactive or lazy to move, several factors that make students not active are: the convenience of playing online games, not having friends to exercise, not getting enough attention from parents and the distance to the sports venue is quite far. Then with these considerations in mind, the researcher tries to apply a circuit game to improve the fitness of the students.

Circuit games are a method of group practice and have posts for each group to move around based on the time determined simultaneously [22]. Whereas [23] said that circuit training is a system of physical condition training that impacts overall body fitness such as endurance, speed, agility, flexibility, mobility and balance. In simple terms, a circuit game is a basic movement in the form of a game that is carried out systematically and in a structured way, starting from the initial movement to several predetermined posts. And each circuit game material between one post and another post is different, but the duration of time used in playing games at each post has the same duration. This training method is one of the researchers' steps to provide stimulus to children aged 8-12 years to change habits that do not have a positive impact on body health. This is also one of the researchers' efforts to apply game-based training circuit training to improve the physical fitness quality of high school elementary school students. Training through circuit games turns out that students don't feel bored, bored and lazy to follow the entire series of training models that apply, this is the impact of choosing a simple circuit game. Because the circuit games used in this study are games that students like or have often done. The purpose of this research is to improve the physical fitness of elementary school students with a series of games designed in the form of a circuit training method.

2   Method

A total of 40 boys aged 8-12 years were selected from the initial group of 60 boys who were registered as potential subjects in this study. The games that were applied to all subjects were approved by the local school principal and 3 sports teachers, and circuit games were adjusted to the abilities of the subjects. The inclusion criteria in this study were based on the following characteristics of the subjects: they had to be 8-12 years old, be in grades 4.5 and grade 6, then the subjects also did not have health disorders such as heart disease, respiratory problems and so on. so that when playing every game that is implemented in the form of a circuit it doesn't cause things that we don't want.

2.1   Study Design

The method in this study is a quasi-experimental method, with a pre-test and post-test design. The draft image below is the design plan in this study:

Table 1. Research Design

Pre-test	Treatment	Post-test
A_1	Circuit Games (four posts)	A_2

A_1 :Pre-test student's physical fitness
A_2 :Post-test student's physical fitness

2.2   Research Participants

The author does not allow students who have health disorders to participate in this re-search. Then, subjects who meet the criteria will be given treatment in the form of a circuit game consisting of 14 grade 4 students with 9 students aged 8 years and 5 students aged 9 years, grade 5 students totaling 13 students, 5 students aged 10 years and 8 students aged 11 years, and the last subject was grade 6 students totaling 11 students, 6 students aged 11 years and 5 students aged 12 years.

2.3   Data Collection and Instrumentation

The circuit game implementation program was carried out to the subjects for 1 month and 2 weeks with details of 2 weeks used for the initial test or initial test while 4weeks were used for the final test. As for in 1 week 2 times the treatment sessions to the subjects. The treatment lasts 1 hour and 10 minutes, consisting of 15 minutes of warm-up, 45 minutes of circuit play and 10 minutes of cool-down. The main purpose of circuit games is to improve physical fitness which includes 10 biomotor components such as endurance, speed, agility and so on. The instruments in this study used tests and measurements which included five tests, namely 50 m sprint, 20-30 second sit ups, hanging elbows bent, vertical jumps and 400 m long distance running. all of these tests are based on elementary school students who are in grades 4,5 and 6.

2.4   Statistical Analysis

In obtaining valid and accurate research data results, the researcher uses an analyzer with the following formula:The first is that the researcher first conducts a prerequisite test which includes the normality test, homogeneity and t test. These data were then analyzed using SPSS version 25.

3   Result

Below are the results of testing the effect of circuit games on the physical fitness of elementary school students in grades 4,5 and 6 at the Muhammadiyah elementary school in the city of Yogyakarta which can be explained in detail and sequentially as follows:

Pre-test data for the first post, namely the 50-meter run, obtained a maximum score of 9.30 seconds, then a minimum score of 10.10 seconds. The pre-test data for the second post is the hanging elbow bend, the maximum score is 30 seconds, then the minimum value is 10 seconds and the average value obtained is 18 seconds. The pre-test data for the third post is sit up 30 seconds with a maximum score of 14, a minimum score of 7 and an average score of 11. The pre-test data for the fourth post is a vertical jump of 31 cm, a minimum score of 10 cm and an average score of 27 cm. The pre-test data for the fifth or last post is the 400-meter run with a maximum score of 4 minutes 29 seconds, a minimum score of 6 minutes 15 seconds and an average score of 5 minutes 40 seconds. After the five posts had an initial trial, the researcher then conducted a post-test. The following is the post-test data from the five posts as a training circuit game medium.

The post-test data for the first post is the 50-meter run in 7.20 seconds, the minimum score is 9.5 seconds, and the average score is 8.15 seconds. The post-test data for the second post is the hanging elbow bend, the maximum score is 60 seconds, then the minimum score is 35 seconds and the average score is 40 seconds. Post-test data for the third post, namely sit ups 30 seconds, the maximum score is 18, the minimum score is 10 and the average score is 14. The post-test data for the fourth post is a vertical jump of 35 cm, a minimum score of 12 cm and an average score of 32. 5cm. The post-test data for the fifth or last post is a 400-meter run with a maximum score of 3 minutes 15 seconds, a minimum score of 5 minutes 10 seconds and an average score of 4 minutes 13 seconds. Data from the complete pre-test and post-test results are described in table 2.

Table 2. Description of the pre-test and post-test data

The calculation results	Pre-test	Post-test
Maximum Value	17	26
Min Value	9	14
Average value	13,10	17,20
Standard Deviation	2,30	1,00

Based on the results of data analysis in table 1 above, it can be seen that the pre-test results obtained students' physical fitness test data with a minimum value range of 9 to 17 maximum scores, while the average score was 13.10 and the standard deviation value was2.68. From the same table, the results of the post-test show that the results of the post-test data were obtained by a physical fitness test with a minimum score of 14 to 26 with a maximum score, while the average score was 17.20 and a standard deviation value of 1,00.

The next step, the researcher conducted a prerequisite test which included three tests, namely the data normality test, homogeneity test and t test to answer the-hypotheses in this study. The following are three tests in the study, each of which is presented in table 3.:

Table 3. Normality Test Results

Data Group	Lo value	Ltable value	Conclusion
Pre-test	0,1473	0,1695	Normal
Post-test	0,7623	0,9878	Normal

Based on table 3 above, the results of the calculation of the normality test for the physical fitness of the pre-test and post-test students can be obtained with a value of Lo = 0.1473 while the value of L table = 0.1695 with a total of 40 students with a significant level of 0.05. So that the data in this researcher shows that the pre-test group of students' physical fitness is normally distributed.

The pre-test data was declared normal, so the researcher performed normality test calculations on the post-test data and obtained a value of Lo = 0.7623 while the value of L table = 0.9878 with a total of 40 subjects with a significant level of 0.05. Thus the results of the post-test physical fitness data were declared normal.

Table 4. Results of the data homogeneity test

Group	Lo-Value	*L-table*	Sig.	Ket.
Pre-test,Post-test	11,2478	26,710	0,01	Homogeneous

Based on the results of the research variable homogeneity test, it is known that the value of Lo is smaller than L-table, so that the data is declared homogeneous, then the significance level is greater than 0.05, which is equal to 0.135. Based on the significance level, the pre-test and post-test data were declared homogeneous.

Table 5. Data t test results

	Paired Differences 95% Confidence Interval of the Difference Upper	T	df	Sig. (2-tailed)
Pair 1 Preetest Experiment and Postest Experiment	-89.139	-19.483	3 9	.000

Based on the results in table 5 above by calculating using the t-test formula, then obtaining an L-count score = 89,139, then this value is compared with the L-table value (df = n-1 = 39 = 0.05) obtained 19,483. so that an L-table is obtained, thus the hypothesis in the study which states that circuit games affect the physical fitness of Muhammadiyah elementary school students in the city of Yogyakarta can be accepted after researchers carry out scientific research.

4   Discussions

The purpose of this study was to find out whether circuit games affect the physical fitness of Muhammadiyah elementary school students in the city of Yogyakarta. The concern about the physical activity of elementary school students in modern times is very sad. This is indicated by various diseases experienced by elementary school students, such as obesity, porous bones and so on. However, the awareness to overcome the problems experienced by elementary school students is very low. Thus encouraging researchers to overcome the problems experienced by elementary school students through physical activity with a four post approach. Based on the results in table 4 above by calculating using the t-test formula, then obtaining an L-count score = 89,139, then this value is compared with the L-table value (df = n-1 = 39 = 0.05) obtained 19,483. so that an L-table is obtained, thus the hypothesis in the study which states that circuit games affect the physical fitness of Muhammadiyah elementary school students in the city of Yogyakarta can be accepted after researchers carry out scientific research. These results are consistent with the results of research by Wali et al (2020: 1) that the application of circuit game-based training methods has an effect on increasing various types of physical fitness components in fifth grade elementary school students. With the results obtained t count = 17.211 and t thick = 4.391, because t count is greater than t table or 17.211 > 4.391 at a significant level of 5% with df = N-1 (20-1) = 19 or the subject experienced an increase when pre-test and post-test of 10.20 with a mean of 0.724 or an increase of 1.15%.

Further research results [24], shows that circuit game-based exercises can have a significant effect on increasing the physical fitness of upper grade elementary school children after being given treatment for 2 weeks with the provision that in one week three treatments. Besides that, it is confirmed by the results of the study Laakso et al., (2021) which proves that training using the circuit game method with three posts can improve the physical fitness of low grade elementary school children. Then the research results [25] concluded that there was a significant effect of circuit game-based training methods on increasing the physical fitness of grade 4 and 5 elementary school students, not only increasing physical fitness but also improving various bio motor components of students such as speed, agility, endurance, coordination and muscle strength.

One of the sports activities that can improve the physical fitness of an individual, in this case a student, is the correct application of training methods or circuit game-based learning methods in addition to other sports activity methods [26]. In line

with the statement Tanner et al., which states that circuit games are a way of training where the exercise has many impacts on different conditions, as a requirement for fitness, and can be done anywhere and anytime in the sense that circuit games are not fixed in one particular place. Dahlan & Alimuddin, explains that circuit training or games are training carried out in accordance with the form of a circuit which consists of several training posts in order to improve physical abilities and is training that is carried out continuously or with certain pattern obstacles consisting of 6-9 posts. Circuit game is a playing activity that has circuits, namely having several posts in carrying out various sports activities with various goals that are closely related to one's health. Each post has a different activity or sports activity that must be done by an individual before continuing to another post, that's why it's called a circuit because the sports activities carried out have several stops or posts. Permainansirkuitdapatdilakukanseseorangsecarakelompokataupunsecaraindividu. This circuit game model can be in the form of a circle or zig-zag and this circuit game can be done by an individual continuously and sequentially. As explained by Ningtyas&Risina, Circuit play is a pattern of training in a sport where the training is carried out continuously and sequentially for one round or circuit using a different set of exercises, by prioritizing the objectives of the exercise and involving all of an individual's best strengths.

In the world of education, very often the teachers, in this case the sports teacher, are always fixated on a monotonous teaching style, fixated on a standardized format that is liked by an institution, not liked by students,even far from the things needed by students, so this will trigger the students are not actively moving, quickly experience boredom, often experience boredom, do not want to linger in the learning process and are lazy to participate in the learning process, so that it has an adverse impact on the health and physical fitness of students. The model that is used during the training process and the learning process, this will cause various types of diseases that are deadly for students, forexample a disease that is often experienced by students is overweight. This is because the students eat too much food but are not balanced with sports activities or any activity so as to prevent the accumulation of fat in various point areas such as the arms, stomach and so on. The students who do not do sports activities often seem to be overweight because the food consumed cannot be processed by the body into energy.

5   Conclusion

Based on the research results described in full above, this study can draw the following conclusions: 1). There is a significant increase that occurs in the physical fitness of elementary school students aged 8-12 years, with a circuit game-based learning process, 2). There is a significant increase in the factors of speed, endurance and reactionspeed in students, 3). The learning process based on circuit games has an impact not only on the physical fitness of students but also on the values that apply in sports, for example: sportsmanship, cooperation, independence and so on, and 4). Game-based learning is still rarely used in the elementary school environment as a medium in the learning process.

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