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The Effect of The Circuit Training Learning Model on The Physical Fitness Level of Fifth Grade Students at SD Negeri 1 Gemiringlor

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ABSTRACT

This study aims to examine the effect of the Circuit Training learning model on the Physical Fitness of Fifth Grade Students of Gemiringlor 1 Elementary School. Physical fitness is the ability of a person's body to carry out daily activities without experiencing excessive fatigue and still have energy reserves to enjoy leisure time and anticipate emergencies. Elementary school children, especially fifth grade (ranging from 10–12 years), are a period of rapid physical and motor development transition. The study used a quantitative method with a quasi-experimental design. The design used was a One-Group Pretest-Posttest Design. The population in this study were all fifthgrade students of Gemiringlor 1 Elementary School. The sampling technique used a saturated sampling technique. The number of samples in this study was 31 students. The instrument used was the Indonesian Physical Fitness Test (TKJI) for Ages 10–12 Years published by the Ministry of Education and Culture. Data analysis was carried out quantitatively using SPSS 26.0 software with hypothesis testing using a Paired sample t-test. The results showed improvements were seen in all TKJI components, these improvements indicate that the implementation of the TKJI was effective *circuit training* provides training stimuli involving various components of physical fitness, such as speed, strength, muscular endurance, explosive power, and cardiorespiratory endurance. The results of the Paired Sample t-Test showed that all TKJI components had a significance value of $p < 0.001$. The total TKJI score rose from an average of 13.81 to 17.32, representing an increase of 3.52%.

Keywords: Circuit Training, Physical Fitness, TKSI

INTRODUCTION

At the elementary school level (SD), physical education (PJOK) plays a crucial role in fostering a healthy and active lifestyle from an early age (Mulyana et al., 2024). Elementary school children, particularly fifth grade (aged 10–12), are a transitional period of rapid physical and motor development (Lubis et al., 2025). During this phase, students' involvement in structured physical activities significantly determines their level of physical fitness. Physical fitness is the body's ability to perform daily activities without experiencing excessive fatigue and still have energy reserves to enjoy leisure time and anticipate emergencies (Pratama et al., 2025). Optimal physical fitness in children not only impacts physical health but also directly supports concentration and academic achievement. Students with good physical fitness tend to be more focused, energetic, and avoid various health problems as early as possible.

The reality on the ground reveals significant challenges regarding the physical fitness levels of elementary school students today. Developments in digital technology, such as the widespread use of smartphones and online games, have led to a shift in students' lifestyles, leading to a more sedentary lifestyle (Khemal & Mulyaningsih, 2025). Children spend more time sitting in front of screens than engaging in activities or exercising outdoors. This indirectly reduces children's physical endurance, muscle strength, agility, and flexibility.

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Based on the results of initial observations conducted at SD Negeri 1 Gemiringlor, indications of low levels of physical fitness were found in fifth-grade students. This was seen during the Physical Education (PJOK) learning activities, where most students quickly felt tired when doing moderate movement activities, lacked enthusiasm when asked to do basic physical exercise movements, and had limited endurance when running. In addition, the learning model applied by teachers in physical exercise materials seemed monotonous and lacked variety, thus making students feel bored and passive in participating in the learning process.

The main problem that triggers low physical fitness and lack of enthusiasm in physical education (PJOK) learning is the selection of learning models that lack variety and efficiency. Conventional physical training often fails to provide equal opportunities for all students due to the limited time available for PJOK learning in schools, which only lasts a few hours per week. Therefore, a more innovative, structured, and enjoyable learning approach or model is needed for elementary school-aged students.

One learning model that is considered effective and efficient for improving students' physical fitness is the circuit training learning model. Circuit training is a training method that combines several training stations or posts with a variety of different physical movements (such as agility, strength, endurance, and coordination) that are carried out sequentially within a certain duration or time span (Supriadi et al., 2025). This model has the potential to increase the active involvement of students as a whole because each student moves dynamically from one post to another without too long a pause, so that the efficiency of training time can be achieved optimally (Fatah & Syafi'i, 2025).

The implementation of circuit training for elementary school-aged children is adapted to the concept of game-based learning and a variety of engaging stations, thereby reducing boredom and increasing exercise motivation (Wisata et al., 2026). The exercise components contained in the circuit training stations can also be specifically designed to meet the standard physical fitness measurement indicators for children aged 10–12 years, as summarized in the Indonesian Physical Fitness Test (TKJI).

Based on these issues, researchers were interested in scientifically testing the extent to which the circuit training learning model can impact students' physical fitness levels. Therefore, researchers conducted an experimental study entitled "The Effect of the Circuit Training Learning Model on the Physical Fitness Levels of Fifth-Grade Students at SD Negeri 1 Gemiringlor.

METHOD

This study aims to test the influence of learning models *Circuit Training* on the Physical Fitness of Fifth Grade Students of SD Negeri 1 Gemiringlor. The study used a quantitative method with a quasi-experimental design. The design used was a One-Group Pretest-Posttest Design. In this design, the experimental group's physical fitness level was measured before being given treatment (pretest), then given treatment in the form of a circuit training learning model, and ended with a re-measurement (posttest). The population in this study were all fifthgrade students of SD Negeri 1 Gemiringlor. The sampling technique used a saturated sampling technique. The number of samples in this study was 31 students.

The inclusion criteria for this study included the following requirements. First, fifth grade elementary school students who were actively enrolled and aged between 10-12 years old. Second, students were in good physical health and had no history of health disorders that could affect the research process. Third, students were willing to participate in the entire

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research process voluntarily. Fourth, students obtained permission from their parents or guardians to participate in the study.

The instrument used was the Indonesian Physical Fitness Test (TKJI) for 10–12 Year Olds published by the Ministry of Education and Culture. Data analysis was conducted quantitatively using SPSS 26.0 software, with hypothesis testing using a paired sample t-test with the following hypotheses.

a. If the value$Sig.\ (2-tailed) < 0{,}05$, for$H_0$rejected and$H_a$accepted (there is a significant influence).
b. If the value$Sig.\ (2-tailed) \geq 0{,}05$, for$H_0$accepted and$H_a$rejected (there is no significant influence).

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Table 1. Descriptive Statistics Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Pre_Lari 40 m	31	7.12	7.98	7.5500	.19911
Post_Lari 40 m	31	6.64	7.61	7.1300	.22527
Pre_Hang Elbow	31	9.6	19.4	14.500	2.2872
Post_Hanging Elbows	31	14.9	25.9	20.000	2.4357
Pre_Sit-Up	31	20	32	26.00	2.658
Post_Sit-Up	31	24	37	31.81	3.280
Pre_Vertical Jump	31	32	48	40.00	3.786
Post_Vertical Jump	31	39	55	47.00	3.715
Pre_Lari 600 m	31	148.1	175.9	162.000	6.4741
Post_Lari 600 m	31	134.7	160.2	147.000	6.3823
Pre_Skor Total TKJI	31	11	17	13.81	1.493
Post_Score Total TKJI	31	15	21	17.32	1.579
Valid N (listwise)	31				

Based on the descriptive statistics of 31 students, there was an increase in TKJI results from the pretest to the posttest. The average 40m run time decreased from7.55 seconds to 7.13 seconds, while the Elbow Hanging increased from14.50 to 20.00 seconds. The average Sit-Up increased from 26.00 to 31.81 times, Vertical Jump from40.00 to 47.00 cm, and the 600 m run time decreased from162.00 seconds to 147.00 seconds. In line with the increase in each component, the average. The Total TKJI Score increased from 13.81 to 17.32, which shows an increase in the level of physical fitness of students after implementing the treatment.

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Normality Test

Table 2. Normality Test

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Say.	Statistic	df	Say.
Diff_Lari40m	.041	31	.200*	.997	31	1.000
Diff_HangElbow	.036	31	.200*	.997	31	1.000
Diff_SitUp	.189	31	.071	.914	31	.065
Diff_VerticalJump	.145	31	.095	.959	31	.273
Diff_Lari600m	.025	31	.200*	.999	31	1.000
Diff_TotalTKJI	.296	31	.200	.790	31	1.000
*. This is a lower bound of the true significance.						
a. Lilliefors Significance Correction						

Based on the results of the normality test Shapiro-Wilk, all variables 40 m Running, Elbow Hanging, Sit-Ups, Vertical Jump, 600 m Running, and Total TKJI have significant values> 0,05, so that all the pretest and posttest difference data are stated normally distributed. Thus, the data meets the assumption of normality and can be continued using Paired Sample t-Test.

Paired t-test

Table 3. Paired t-Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Pre_Lari 40 m - Post_Lari 40 m	.42000	.06976	.01253	.39441	.44559	33.521	30	.000
Pair 2	Pre_Elbow Hanging - Post_Elbow Hanging	-5.5000	.8967	.1610	-5.8289	-5.1711	-34.152	30	.000
Pair 3	Pre_Sit-Up - Post_Sit-Up	-5.806	1.014	.182	-6.178	-5.435	-31.886	30	.000
Pair 4	Pre_Vertical Jump - Post_Vertical Jump	-7.000	1.366	.245	-7.501	-6.499	-28.526	30	.000
Pair 5	Pre_Lari 600 m - Post_Lari 600 m	15.0000	1.9911	.3576	14.2696	15.7304	41.944	30	.000
Pair 6	Pre_Score Total TKJI - Post_Score Total TKJI	-3.516	.626	.112	-3.746	-3.287	-31.292	30	.000

Based on the results Paired Samples t-Test in 31 students, a significance value was obtained (Sig. 2-tailed) of 0.000 < 0.05on all TKJI components. These results show that there is statistically significant difference between pretest and posttest measurement results after students received treatment. In the 40 m running component, the average difference was 0.420 seconds shows a decrease in travel time from pretest to posttest, which physiologically can be interpreted as an increase in speed ability.

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In the Elbow Hanging, there was an average increase of5,500 seconds, while Sit-Up increased by5,806 times and Vertical Jump increased by7,000 cm, which showed positive changes in muscle strength and explosive power capabilities. In the 600 m run, the average run time decreased by15,000 seconds, which indicates an increase in endurance ability because students are able to complete the same distance in a shorter time. Furthermore, The Total TKJI Score experienced an average increase of 3.516 points, with a pretest average of13,81and posttest of17,32. Mark *t*as big as −31,292on the total score with df = 30 And Mean = 0.000 shows that the difference is very unlikely to have occurred by chance based on the 5% significance limit. Thus, statistically there is significant changes in the level of physical fitness of students between before and after treatment. However, because the design used was a measurement on the same group before and after treatment, the results *Paired Samples t-Test* directly prove pretest–posttest differences.

DISCUSSION

Based on the results of research on 31 children, it was found that there was an increase in physical fitness abilities after the implementation of learning model *circuit training*. The increase was seen in all components of the Indonesian Physical Fitness Test (TKJI), namely the 40-meter run, elbow hang, *sit-up*, *vertical jump*, 600 meter run, and total TKJI score. The test results *paired sample t-test* also shows that all components have significant values p < 0,001, so there is a significant difference between the pretest and posttest results.

On ability run 40meterThe average pretest time of 7.55 seconds decreased to 7.13 seconds on the posttest. This represents a 0.42-second increase in speed. This decrease indicates that children were able to complete the run in a shorter time after participating in the *circuit training.* This can be explained because circuit training allows students to perform various physical activities sequentially with controlled rest periods, thus providing a stimulus for speed ability, leg muscle strength, and motor coordination. Iqbal & Suripto (2023), who used the TKJI instrument also found an increase in physical fitness after students received circuit training through design.*one group pretest-posttest*.

On the components hanging elbows, the average result increased from 14.50 seconds to 20.00 seconds or an increase of 5.50 seconds. The test results *paired sample t-test* show value t = -34,152; p < 0,001, so the difference is significant. This increase indicates a development in muscle strength and endurance, particularly in the arm and shoulder muscles *circuit training.* Students perform activities at several stations with different types of exercises so that the training stimulus is not limited to one muscle group. Research on the application of circuit training to students also shows that this model can be used to develop several components of fitness in an integrated manner (Lomamay et al., 2026).

Improvements also occurred in the ability sit-up. Average number *sit-up* increased from 26.00 times in the pretest to 31.81 times in the posttest, or an increase of approximately 5.81 times. The results of the statistical test show t = -31,886; p < 0,001. The results show that there is a significant difference after the application *circuit training*. Improvement *sit-up* related to the development of abdominal muscle strength and endurance because the activities in circuit training can provide repeated stimulation to certain muscle groups. Research on elementary school students who applied *circuit training* also reported an increase in fitness components after the exercise program was carried out in a structured and gradual manner (Amalia et al., 2026).

On vertical jump, the average result increased from 40.00 cm to 47.00 cm, so there was an increase of 7.00 cm. The test results *paired sample t-test* show t = -28,526; p < 0,001. This increase indicates the development of explosive power capabilities of the leg muscles. In

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learning *circuit training.* Exercises involving explosive movements and the use of leg muscles can stimulate the ability to generate power in a short period of time. Thus, repeated and structured training can help students improve the explosive movement skills required for the test *vertical jump*.

On run 600meter, the average travel time decreased from 162.00 seconds to 147.00 seconds. This means that students' travel time was 15 seconds faster. The test results *paired sample t-test* get t = 41,944; p < 0,001, which shows a significant difference between the pretest and posttest. Improvements in the 600-meter run indicate a development in cardiorespiratory endurance *circuit training* which combines several forms of exercise with regular rest breaks can provide stimulation to the cardiorespiratory system. Research on elementary school students also found that the program *circuit training.* Structured circuit training can significantly improve cardiovascular fitness (Juang et al., 2026). Furthermore, research in children aged 10–12 years shows that circuit training has a significant effect on increasing aerobic endurance (Muhammad et al., 2025)

The increase in all these components is then reflected in total TKJI score. The average total score increased from13.81 in pretest to 17.32 in posttest, or an increase of 3.52 points. The results *paired sample t-test* show t = -31,292; p < 0,001, so that there is a significant difference between the total TKJI score before and after implementation *circuit training*. Thus, improvements do not only occur in one aspect of fitness, but also in several components measured through the TKJI.

The results of this study are in line with the research of Khomariyah et al. (2026) on elementary school students who used design.*one group pretest-posttest.* The study found improvements in all components of fitness after students participated in the program *circuit training* and obtain statistical test results p < 0,05on all tested variables. The research results of Juang et al. (2026) also show that the program *circuit training* A 12-week training program provided significant improvements in the cardiovascular fitness of elementary school students compared to the control group. Similar findings were also reported in the study by Rahayu et al. (2026), which showed an increase in physical fitness learning outcomes in the cognitive, affective, and psychomotor aspects after implementing the method *circuit training* in PJOK learning.

Overall, the research results show that learning with model *circuit training* can be a relevant approach to improve various components of students' physical fitness. The characteristics of the exercises, which are conducted through multiple stations, allow students to experience a variety of physical activities within a single learning session. This variation can simultaneously stimulate speed, strength, muscular endurance, explosive power, and cardiorespiratory endurance. The results of this study are also supported by a systematic review showing that physical fitness interventions in children generally yield positive results when activities are structured (Helme et al., 2025).

However, because this study uses single-group pretest-posttest design without a control group, results *paired sample t-test* directly shows the existence of significant differences between conditions before and after learning using the circuit training model, does not prove a cause-and-effect relationship absolutely.

CONCLUSION

Based on the research results, it can be concluded that there was an increase in physical fitness results after the implementation of the circuit training learning model. Improvements were seen in all components of the TKJI, namely the 40-meter sprint ability which increased from an average of 7.55 seconds to 7.13 seconds, and the elbow hang from 14.50 seconds to

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20.00 seconds *sit-up* from 26.00 times to 31.81 times *vertical jump* from 40.00 cm to 47.00 cm, and the 600meter run from 162.00 seconds to 147.00 seconds. This increase shows that the implementation of *circuit training* provide training stimuli that involve various components of physical fitness, such as speed, strength, muscular endurance, explosive power, and cardiorespiratory endurance.

The results of the Paired Sample t-Test showed that all TKJI components had a significance value of $p < 0.001$, indicating a significant difference between the pretest and posttest results. The total TKJI score also increased from an average of 13.81 to 17.32, or an increase of 3.52%. Thus, the application of the learning model *circuit training.* In this study, there was a significant increase in children's physical fitness. However, because the study used a single-group design *pretest-posttest* without a control group, the research results are more accurately interpreted as the presence of significant changes after implementation *circuit training*, not as absolute proof of causality.

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