

The Effect of Physical Education (PE) Class Management Using Badminton Materials to Improve Elementary School (ES) Students' Concentration

El Efecto de la Gestión de la Clase de Educación Física (EF) Utilizando Materiales de Bádminton Para Mejorar la Concentración de los Estudiantes de la Escuela Primaria (ES)

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Abstract. Concentration is needed for students to support successful learning achievement. Many students experience various concentration problems, especially in elementary schools. This disturbance can come from improper use of gadgets, including playing games excessively. The research was quantitative in nature. It employed a pre-experimental one-group pretest-posttest design. The research sample involved 14 students who were taken using a purposive sampling method. The data about students' concentration were collected from two tests, a GTC test before and after an intervention. They were then analyzed using paired sample t-test and n-gain score. The results of the paired samples statistics test showed that the pre-test value was 46.57 and the post-test value was 55.00. This result indicates an increase in students' concentration scores descriptively. Following that, a t-test was conducted on the paired sample, yielding a Sig value. $0.256 > 0.05$. This means that there is no significant difference between the pre-test and post-test in students' concentration scores. An effectiveness test was also performed by calculating the n-gain score. The finding showed an average value of 0.10 and was classified as low. The conclusion is that the implementation of descriptive badminton material PE class management can increase the concentration of elementary school students, but there is no significant increase between pre-test and post-test scores in the groups or classes given the intervention. It is indicated that the increase in students' concentration is caused by the PE intervention with badminton sports material. This finding is also confirmed by previous research, which stated that a significant relationship exists between sports intensity and students' ability to concentrate on learning.

Keywords: Class Management, PE, Badminton, Concentration, Elementary School.

Resumen. Se necesita concentración para que los estudiantes apoyen el logro exitoso del aprendizaje. Muchos estudiantes experimentan diversos problemas de concentración en el aprendizaje, especialmente en las escuelas primarias. Esta perturbación puede deberse al uso inadecuado de los dispositivos, incluido el juego excesivo, etc. Esta investigación fue un tipo de investigación cuantitativa. El diseño de investigación empleó un diseño preexperimental de preprueba y posprueba de un solo grupo. La muestra de la investigación fue de 14 estudiantes tomados mediante un método de muestreo intencional. La técnica de recolección de datos de concentración se realizó realizando una prueba de GTC antes y después de la intervención. La técnica de análisis de datos utilizó la prueba t de muestras pareadas y la puntuación de ganancia n. De los resultados de la prueba de estadística de muestras pareadas, el valor del pre-test es 46.57 y el post-test es de 55.00, lo que significa descriptivamente que hay un aumento en los puntajes de concentración de los estudiantes. Los resultados del valor Sig de la prueba t de muestras pareadas, $0,256 > 0,05$ significa que no hay diferencia significativa entre la prueba previa y la prueba posterior en las puntuaciones de concentración de los estudiantes. Los resultados de la prueba de efectividad de la puntuación n-gain tienen un valor promedio de 0,10 y se clasifican en la categoría baja. La conclusión es que la implementación del material descriptivo de bádminton en el manejo de la clase de educación física es capaz de aumentar la concentración de los estudiantes de educación primaria, pero no hay un aumento significativo entre las puntuaciones pretest y postest en los grupos o clases que reciben la intervención. Se indica que el aumento en la concentración de los estudiantes se debe a la intervención de educación física con material deportivo de bádminton, lo que también es confirmado por investigaciones anteriores que afirmaron que existía una relación significativa entre la intensidad deportiva y la capacidad de los estudiantes para concentrarse en el aprendizaje. Sin embargo, la implementación de material de educación física de bádminton es capaz de aumentar la concentración de los estudiantes y se concluye en la categoría de baja efectividad.

Palabras clave: Gestión de clase, educación física, bádminton, concentración, escuela primaria.

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Introduction

Concentration is needed for students to support successful learning achievement. Through high learning concentration, students will easily accept the lesson material presented by the teacher at school. On the other hand, low learning concentration will make it difficult to receive and understand the lesson material. Many students experience various learning concentration problems, especially in elementary school. This disturbance can come from improper

use of gadgets, such as playing games excessively or watching useless videos on gadgets. These excessive activities with gadgets make the students bored, unmotivated, easily tired, and difficult to concentrate. Many scholars argue that concentration in school is important as it enables students to digest teaching material better (Caamaño-Navarrete et al., 2021; Gelabert et al., 2021). Meanwhile, loss or decreased concentration leads to decreased motivation levels, as reported by several studies (Picariello et al., 2017; Rimes et al., 2016; Schakel et al., 2019; Sorkkila et al., 2017).

This impaired concentration is an obstacle for schools and teachers in achieving educational goals, particularly learning goals for various subjects in elementary school.

To address this issue, previous research has made various efforts to increase students' concentration (Cecep et al., 2022; Khotimah et al., 2020; Nurhayati & Homdijah, 2020). A study conducted by Nurunnabilah et al. (2022) concluded that manipulative movement games are an appropriate effort to increase student learning concentration. Another study found a significant relationship between sports intensity and students' ability to concentrate on learning (Nusufi, 2016). Among the methods to overcome the decline in learning concentration is the learning while-playing method, where the teacher invites students to learn within the framework of a game. There is competition, rules, and a reward system prepared. The conducted methods and classroom management can also increase learning concentration because of the pleasant atmosphere during learning. It shows that students' concentration abilities can be improved through various forms of exercises in elementary school learning, which can be included in the Physical Education (PE) subject. The benefits of physical activity or sports packaged in PE at school are threefold. First, PE can increase academic achievement, non-cognitive skills, motor skills, and physical activity. In addition, children's involvement in PE has a positive relationship with functional body shape. Finally, activeness or discipline in carrying out PE activities has a protective effect on mental health (Allen et al., 2019; Knaus et al., 2020; Madeira et al., 2019)

Physical education, sports, and health (PE) are focused on value-based learning to cultivate the skills needed in the 21st century (Susanto et al., 2023). Through PE subjects, various forms of sports training can be implemented, which provide various psychological and physical benefits, including student concentration. Class management is also required in implementing Physical Education learning according to the chosen material and form of physical activity or sports game. Teaching and learning activities that begin in a structural and regular manner can benefit students, making it easier for them to concentrate on receiving lessons (Arikunto, 2000). Classroom strategies that need to be implemented are students' condition to be ready to learn in class, learning to concentrate, using appropriate and varied methods, interacting educationally and communicatively, and using media according to the material presented. (Nugraha, 2018). Teachers and class managers have a major role in creating an effective class (Hidayat et al., 2020). It will encourage the achievement of the objectives of each PE learning material taught at school. Games and sports that can be applied in PE include badminton net games. Badminton is a sport that is classified as active in coordinating various body movements, such as the legs, hands, and sharp eye gaze. In addition, badminton has also become a well-known sport in Indonesian society and is also beneficial for health. In clinical cases, badminton exercise can be treated as an option for those who want to reduce uric acid levels (Kinasih et al., 2021). Thus, PE class management based on

games and sports can be implemented in learning to maintain fitness and increase student concentration in elementary school.

Up to the present, research related to badminton has been widely conducted, for example, Corrales et al. (2021), Rodríguez et al. (2022), and Susiono et al. (2024). Likewise, other research tried to associate general physical activities with concentration (Corona et al., 2019; Santamaría et al., 2018; Manzano et al., 2024; Valencia Sánchez et al., 2023). In addition, researchers also investigate sports class management and sports management (Setyawan et al., 2023; Setyawan et al., 2024). Despite the burgeoning data, no research has discussed and tested the effectiveness of badminton-based Physical Education class management in increasing student concentration in elementary schools. Based on the explanation above, this research aims to determine and test the effectiveness of implementing Physical Education (PE) class management using net games (badminton) materials in increasing student concentration in elementary schools (ES).

Methods

This research was quantitative. It employed a pre-experimental one-group pre-test and post-test design, characterized by no randomization and without a comparison group. The one-group experimental design is described in Table 1:

Table 1.

Pre-experimental design (one-group pretest-posttest design)

Pre-test	Treatment	Post-test
O1	X	O2

Information:

O1: Results of pre-test

X: Implementation of PE class management using badminton sports material

O2: Results of post-test.

This research was carried out at Jogokariyan Muhammadiyah Elementary School, Yogyakarta. The population in this study were all students in grades IV – V. The sample for this research consisted of 14 students, who were chosen using a purposive sampling method. They were selected based on the following criteria: 1) students who were not badminton athletes, 2) students who did not have special needs, 3) students who did not have eye problems (plus or minus), 4) students who fell into the category of upper elementary school students, and 5) students who agreed to become research samples.

To measure students' concentration, the research used an instrument called the grid concentration exercise test, as shown in Table 2, adopted by Dorothy. The concentration data were collected by giving a grid concentration test before and after being given the implementation of PE based on the net games (badminton). The CGT in this study was conducted using the following steps. First, the test instrument had 10 x 10 boxes. Each box contained two-digit numbers from 00 to 99. The test was begun by connecting the numbers with lines starting with the numbers 00 to 99

for 1 minute. Finally, the concentration ability score was obtained by calculating the highest score minus the errors made.

Table 2.

Grid Concentration Test (CGT) Instrument									
84	27	51	78	59	52	13	85	61	55
28	60	92	04	97	90	31	57	29	33
32	96	65	39	80	77	49	86	18	70
76	87	71	95	98	81	01	46	88	00
48	82	89	47	35	17	10	42	62	34
44	67	93	11	07	43	72	94	69	56
53	79	05	22	54	74	58	14	91	02
06	68	99	75	26	15	41	66	20	40
50	09	64	08	38	30	36	45	83	24
03	73	21	23	16	37	25	19	12	63

After obtaining the test scores, they were categorized into several concentration categories, as shown in Table 3:

Table 3.

Grid Concentration Test Criteria		
No	Criteria	Information
1	>21	Very Good Concentration
2	16-20	Good Concentration
3	11-15	Medium Concentration
4	6-10	Low Concentration
5	<5	Very Low Concentration

These data were then advanced to the analysis stage. This first stage of data analysis involved a parametric paired sample t-test, provided that the prerequisite test (normality) had been met. The paired sample t-test was used to determine the difference or increase in the average value of students' concentration scores before and after the intervention, i.e., the implementation of badminton material PE. Meanwhile, calculations were carried out using SPSS Version 25.0.

The second stage of the data analysis technique in this research used the N-gain Score Test. The test aimed to determine the level of effectiveness of badminton sports material on the student concentration scores. At this stage, it employed the following formula:

$$g = \frac{Sf - Si}{Smax - Si}$$

Information

g = gain

Sf = Post-test average value

Si = Pre-test average score

Smax = Maximum value

The level of effectiveness was determined using Hake's (1998) criteria, as provided in Table 4 below:

Table 4.

Effectiveness Level Criteria	
Value g	Criteria
$G \geq 0.7$	Tall
$0.3 \leq G < 0.7$	Currently
$G < 0.3$	Low

Implementing PE using net games (badminton) to increase students' concentration in elementary school involves four aspects of management functions, including

planning, organizing, implementing, and evaluating/assessing. In this study, the implementation was carried out in several stages. For instance, students learned badminton by practicing throwing a shuttlecock towards a square target on a wall at a distance of 2-4 meters. It was done 10 times (shuttlecocks) in each session and was carried out in 12 sessions. The procedure for carrying out this exercise is explained by the following lists:

1. Students stood behind the throwing line in a position to prepare to throw the shuttlecock towards the target box on the wall. In this shuttlecock throwing activity/exercise, the students must focus or concentrate on the throwing target.

2. Having finished throwing the shuttlecock toward the target box on the wall, then the shuttlecock was taken and thrown back toward the target box on the wall up to 10 times.

3. Score was determined based on the results of the hitting shuttlecock target box on the wall, with a score of 1 if you hit the target and a score of 0 if you did not hit the target

4. After completing all the scores from the shuttlecock throws obtained, they were then added up and converted into a numerical value on a scale of 1-100.

Results

This section presents the quantitative results of students' pre-test and post-test concentration scores during the implementation of PE class management using badminton material at Jogokariyan Muhammadiyah Elementary School, Yogyakarta. Table 5 summarizes the results and shows that the descriptive statistics of pre-test concentration data have a minimum value of 29, a maximum value of 71, a mean value of 46.57, and a standard deviation of 15.693. Meanwhile, the concentration post-test results showed that the minimum value was 18, the maximum value was 82, the mean value was 55.00, and the standard deviation was 21.800.

Table 5.

Descriptive Statistics

	Descriptive Statistics				
	N	Min	Max	Mean	Std. Dev
Concentration Pre-Test	14	29	71	46.57	15.693
Concentration Post-Test	14	18	82	55.00	21.800
Valid N (listwise)	14				

These data were then proceeded to undertake a normality test. Table 6 shows the output test of normality value for all pre-test and post-test concentration data. The table indicates that both Kolmogorov-Smirnov and Shapiro-Wilk tests have a significance value (sig.) > 0.05. Therefore, it can be concluded that the research data is normally distributed.

Table 6.

Tests of Normality

Class	Tests of Normality	
	Kolmogorov-Smirnova	Shapiro-Wilk

	Statistics	df	Sig.	Statistics	df	Sig.
Concentration Pre-Test	.154	14	.200*	.894	14	.092
Concentration Post-Test	.126	14	.200*	.927	14	.274

The next analysis was paired sample statistics. The results are provided in Table 7, showing that the pre-test concentration value is 46.57, while the post-test concentration is 55.00. These values imply a descriptive increase from the pre-test to the post-test value. Thus, it can be concluded that the implementation of descriptive badminton PE material can improve students' concentration scores.

Table 7.
Paired Samples Statistics

		Paired Samples Statistics			
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Concentration Pre-Test	46.57	14	15.693	4.194
	Concentration Post-Test	55.00	14	21.800	5.826

The results of the paired samples statistics were analyzed again to produce a t-test result for the implementation of PE in badminton material. Table 8 below shows that the output of the paired samples test obtained a sig value. (2-tailed) is $0.256 > 0.05$. Therefore, it can be concluded that there is no difference in the students' average concentration scores between the pre-test and post-test after attending PE

Table 9.
N-Gain Score Test Results

No	Name	Pre-test	Conversion	Badminton Training Intervention 1-12												Post-test	Conversion	N-Gain
				1	2	3	4	5	6	7	8	9	10	11	12			
1	AAV	11	65	7	5	8	9	10	10	9	7	6	9	8	10	8	47	-0.50
2	FFR	9	53	8	5	7	9	6	7	7	9	6	10	10	10	11	65	0.25
3	DOM	5	29	3	3	7	7	7	5	9	7	10	9	9	6	12	71	0.58
4	NR	5	29	4	8	6	2	5	4	3	4	8	8	8	8	7	41	0.17
5	AZN	12	71	9	5	9	8	6	6	6	8	10	9	9	8	13	76	0.20
6	ZAH	12	71	2	9	7	6	4	3	4	6	3	6	5	5	14	82	0.40
7	ANM	6	35	5	6	6	6	8	6	7	6	6	7	5	4	10	59	0.36
8	AZA	7	41	6	6	9	4	9	4	7	4	9	9	5	6	8	47	0.10
9	AAP	5	29	4	5	6	9	7	8	10	7	6	9	9	5	6	35	0.08
10	KKS	7	41	7	7	6	9	7	9	9	8	10	10	8	7	13	76	0.60
11	MNR	5	29	6	6	9	5	5	6	7	6	7	9	7	8	14	82	0.75
12	A A	8	47	4	8	4	6	7	8	5	7	5	6	8	9	9	53	0.11
13	AAR	9	53	2	6	10	5	10	6	6	7	9	7	9	9	3	18	-0.75
14	P.F	10	59	9	8	7	9	9	8	9	8	5	9	8	7	3	18	-1.00
Average N-Gain																	0.10	
Minimum N-Gain																	-1.00	
Maximum N-Gain																	0.75	

Discussion

This section goes into detail, discussing the numbers presented in the previous section. First, the results of the paired samples statistics test in the experimental class group showed that the average score of the pre-test was 46.57, and the post-test average was 55.00. These figures show an increase in the average score of the student concentration. Further, the paired sample t-test on the implementation of PE in badminton material obtained a Sig value. (2-tailed) was $0.256 > 0.05$. This means no significant increase is found in students' concentration scores between the pre-test and post-test after the intervention. These results indicate that the intervention can increase student concentration, although there is not a significant increase between the pre-test and post-test scores in the experimental class

using badminton material.

Table 8.
Paired Samples Test

		Paired Samples Test					t	df	Sig.
		Paired Differences			Std. Error	95% CI of the Difference			
		Mean	Std. Dev.	Lower		Upper			
Pair 1	Pre-Test Concentration - Post-Test Concentration	-8.429	26.532	7.091	23.748	6.891	1.189	13	.256

The effectiveness of implementing PE class management using badminton material to increase student concentration can be determined using n-gain score test analysis. The n-gain score test analysis is designed to determine the effectiveness of applying a particular model or method to the results. In this study, the results of the n-gain score test calculation are summarized in Table 9. The table indicates that the average n-gain score is 0.10, which is classified as the low category (less effective). The minimum n-gain value is -1.00, and the highest is 0.75. Thus, the implementation of badminton material in PE class management to increase concentration is categorized as low.

group. This indicates that the increase in student concentration in the experimental class group is caused by PE class management intervention. This is because there is a significant relationship between sports intensity and students' learning concentration power (Santoso & Anandaputra, 2017). In addition, a relationship or influence is also found between physical exercise and learning concentration (Cendana, 2020; Polevoy et al., 2023; Sandayanti et al., 2021). The results of increasing concentration, which is not yet significant, are also in line with the research by Fadhilah (2022) and Sadikin (2019). They also discovered that the relationship between physical activity or sports and the level of focus is low. They found no significant relationship between regular exercise and students' learning concentration. However, the increasing students' concentration after receiving PE intervention using

badminton sports materials in this study is supported by Reigal et al. (2020). They reported a significant relationship between physical fitness, attention, and concentration. In their research, the tests' results show that oxygen consumption is the best predictor for measuring attention/attention.

It is also important to know that applying sports models, methods, and techniques of PE learning at school can run well if classroom management (theory and practice) is also good. In this context, the lecturers, teachers, or trainers play a vital role in managing classes, depending on how they plan, organize, implement, and evaluate/assess the field of educational sports or professional sports (Setyawan et al., 2023). For example, Pasikha (2017) suggests that teachers must be able to carry out classroom management with preventive and corrective actions. An important role for teachers is needed in classroom management, including activities for organizing classes, arranging students' places, and arranging learning tools (Asmara & Nindianti, 2019). The teacher's vital role was also underscored by Rohiyatun and Mulyani (2017). Their research shows a relationship between classroom management procedures and the smoothness of the teaching and learning process. Classroom management activities are intended to create and maintain an effective and efficient classroom atmosphere and conditions (Wahid et al., 2018). Thus, the class manager has a major role in realizing it (Hidayat et al., 2020). Teaching various types of sports also requires good and measurable class management and training management because many factors can influence sports performance, such as training management, teaching, application of methods and techniques, and physical, tactical, and mental aspects (Setyawan et al., 2023). Therefore, it can be concluded that in general, physical activity, badminton, or other sports that are integrated with class management in PE practice and carried out regularly and measurably will be able to indirectly encourage an increase in their physical fitness. It will also increase study concentration as well.

Furthermore, the results of the n-gain score test showed the average value of the experimental class group was 0.10, which is categorized as low, with a minimum n-gain score of -1.00 and a maximum of 0.75. Previous research has reported a significant relationship between the level of physical fitness, attention, and concentration (Reigal et al., 2020). However, the effectiveness of implementing PE badminton materials in increasing concentration is only in the low-level category. In addition, the quantitative results of this implementation or intervention have resulted in increased concentration scores for elementary school students. The findings of this research are in line with those of Fadhillah (2022) and Sadikin (2019). Likewise, their research indicates that the relationship between physical activity or sports and the level of focus is low, and there is no significant relationship between regular exercise and students' learning concentration. However, other research has also supported the results of this research, where there is an increase in concentration through various types of sports training and various methods. A study conducted by (Elzas,

2021), which also used the Grid Concentration Test instrument, found that there was a significant increase in the concentration of children aged 11-13 years through the physical activity of swimming. A study carried out by (Mulyadi et al., 2021) found that the life kinetic training method can increase the concentration of soccer athletes. There is a significant relationship between sports intensity and students' ability to concentrate on learning (Nusufi, 2016). Thus, it can be concluded that the implementation of badminton material PE class management is able to increase the concentration of elementary school (ES) students with a low effectiveness category.

Conclusion

This study concludes that the implementation of Physical Education (PE) classroom management using badminton material can increase the concentration of elementary school (ES) students. However, there is no significant increase between the pretest and posttest scores in the groups or classes of students who are given this intervention. The increase in student concentration is caused by the Physical Education (PE) intervention in badminton sports material. It is also strengthened by previous research, stating a significant relationship between sports intensity and students' learning concentration. In short, the implementation of Physical Education (PE) using badminton material can increase students' concentration, although it is classified as low (less effective). It can be caused by other factors whose causes have not yet been identified. Therefore, further research needs to be conducted to address this topic.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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