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)

*Universitas Negeri Yogyakarta (Indonesia), **University of Murcia (Spain), ***University of East Sarajevo (Bosnia and Herzegovina), ****Josip Juraj Strossmayer University of Osijek (Croatia), *****Universitas Negeri Padang (Indonesia), *******Universitas Negeri Malang (Indonesia), *********Universitas Riau (Indonesia), **********Universitas Sebelas Maret (Indonesia), **********Universitas Dumat (Indonesia), **********Universitas Islam Riau (Indonesia)

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 pre-test-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 of 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 preparación 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 posttest 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.

Nugroho Susanto
nugrohosusanto@flk.unp.ac.id

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 (Camañano-Nava et al., 2021; Gelabert et al., 2021). Meanwhile, loss or decrease 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 & Homidjah, 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; Knau 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), Rodriguez 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>
<thead>
<tr>
<th>Pre-experimental design (one-group pretest-posttest design)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
</tr>
<tr>
<td>O1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No</th>
<th>Criteria</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&gt;21</td>
<td>Very Good Concentration</td>
</tr>
<tr>
<td>2</td>
<td>16-20</td>
<td>Good Concentration</td>
</tr>
<tr>
<td>3</td>
<td>11-15</td>
<td>Medium Concentration</td>
</tr>
<tr>
<td>4</td>
<td>6-10</td>
<td>Low Concentration</td>
</tr>
<tr>
<td>5</td>
<td>&lt;5</td>
<td>Very Low Concentration</td>
</tr>
</tbody>
</table>

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:

\[ g = \frac{S_f - S_i}{S_{max} - S_i} \]

Information:
- \( g \) = gain
- \( S_f \) = Post-test average value
- \( S_i \) = Pre-test average score
- \( S_{max} \) = Maximum value

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

Table 4.
Effectiveness Level Criteria

<table>
<thead>
<tr>
<th>Value g</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3 ≤ G &lt; 0.7</td>
<td>Tally</td>
</tr>
<tr>
<td>G ≥ 0.7</td>
<td>Currently</td>
</tr>
</tbody>
</table>

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 (shuttle cocks) 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 shuttle cock towards the target box on the wall. In this shuttle cock throwing activity/exercise, the students must focus or concentrate on the throwing target.

2. Having finished throwing the shuttle cock toward the target box on the wall, then the shuttle cock 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 shuttle cock 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 shuttle cock 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

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration Pre-Test</td>
<td>14</td>
<td>29</td>
<td>71</td>
<td>46.57</td>
<td>15.693</td>
</tr>
<tr>
<td>Concentration Post-Test</td>
<td>14</td>
<td>18</td>
<td>82</td>
<td>55.00</td>
<td>21.800</td>
</tr>
<tr>
<td>Valid N (Listwise)</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Kolmogorov-Smirnov</th>
<th>Shapiro-Wilk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class</td>
<td></td>
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</tbody>
</table>
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.

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 using badminton material.

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.

<table>
<thead>
<tr>
<th>Table 7. Paired Samples Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paired Samples Statistics</td>
</tr>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>Pair 1 Concentration Pre-Test</td>
</tr>
<tr>
<td>Concentration Post-Test</td>
</tr>
</tbody>
</table>

Table 8. Paired Samples Test

<table>
<thead>
<tr>
<th>Paired Differences</th>
<th>Mean Std. Dev.</th>
<th>Error Difference</th>
<th>t df Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair Concentration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Test</td>
<td>8.429</td>
<td>26.532</td>
<td>7.091</td>
</tr>
<tr>
<td>Post-Test</td>
<td>23.748</td>
<td>6.891</td>
<td>1.189</td>
</tr>
</tbody>
</table>

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 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, Paskha (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 Fadhilah (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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Datos de los/as autores/as

Amat Komari
Hendra Setyawan
Erwin Setyo Kriswanto
Sajarwo
José Vicente García-Jiménez
Ratko Pavlovic
Agneszka Magdalena Nowak
Nugroho Susanto
Ari Wibowo Kurniawan
Gusliana HB
Abdul Aziz Purnomo Shidiq
Al Malikul Ihwanda Putra
Roziah

amatkomari@uny.ac.id
hendra777setyawan@uny.ac.id
erwin_sk@uny.ac.id
sajarwo@uny.ac.id
jvgjimenez@um.es
pavlovicratko@yahoo.com
eszka.nowak@awf.edu.pl
nugrohosusanto@fik.unp.ac.id
ari.wibowo.fik@um.ac.id
gusliana.hb@lecturer.unir.ac.id
azizps@staff.uns.ac.id
wanda18.wl@gmail.com
roziah@edu.unir.ac.id

Autor/a
Autor/a
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