ETDC Indonesian Journal of Research and Educational Review
Volume 4, No. 2, 2025, pp 397 - 409
e–ISSN 2809-3682
p–ISSN 2809-7505

https://doi.org/10.51574/ijrer.v4i2.2964

TRADITIONAL MASSALLO GAME APPROACH MODEL IN ELEMENTARY SCHOOL: FOOT REACTION SPEED IN BADMINTON

Sulham Sukardi[1], Suwardi Suwardi[2], Muh. Adnan Hudain[3], Ahmad Adil[4], Fahrizal Fahrizal[5]
[1, 2, 3, 4, 5] Universitas Negeri Makassar, Indonesia

Article Info

Article history:

Received January 13, 2025
Revised March 11, 2025
Accepted March 18, 2025

Keywords:

Badminton;
Elementary School;
Foot Reaction Speed;
Massallo;
Traditional Games.

ABSTRACT

This study aims to improve the reaction speed of the feet in badminton through the traditional massalo game approach in students of elementary school. The study employed Classroom Action Research, which involved two cycles of planning, action implementation, observation, and reflection. The population and sample of the study were all grade V students of elementary school 171 Pinrang, totaling 20 students. The results of the study showed a significant increase from the pre-cycle to cycle II. In the pre-cycle, 100% of students were in the less category (score < 80) with 0% completion. Cycle I showed an increase, with 50% of students achieving completion in the sufficient category (score ≥ 80-86). In cycle II, after changes were made to the Massaro game approach, every student (100%) completed the tasks in the sufficient category, with their average reaction time increasing by 35% and their active participation reaching 95%. In conclusion, the traditional massalo game approach has proven effective in improving the reaction speed of the feet in badminton while creating a positive and enjoyable learning experience for elementary school students.

Corresponding Author:

Suwardi Suwardi,
Universitas Negeri Makassar, Indonesia
Email: suwardi6603@unm.ac.id

1. INTRODUCTION

Physical education at the elementary school level plays an important role in shaping character and developing students' physical, mental, and social abilities (Simonton & Shiver, 2021; Pradana, 2021). Badminton, as one of the sports taught in elementary schools, emphasizes not only technical and physical aspects but also mental aspects, including reaction speed, concentration, and tactical thinking skills (Nathan, 2016). Reaction speed, especially in footwork, is a fundamental aspect that affects a player's performance in a badminton match (Limbong, 2021). The problem often faced by elementary school students in learning badminton is the difficulty in developing optimal foot reaction speed. Based on initial observations at public elementary school 171 Pinrang, fifth-grade students showed weaknesses in the effectiveness of foot movements, especially reaction speed. When facing a game situation that requires fast

and precise movements, many students experience delays in responding to the opponent's shot. As a result, they are often in a disadvantageous position on the court, unable to position themselves well to make accurate shots or anticipate the opponent's attacks effectively (Syahruddin & Suyuti, 2022).

Factors that cause low foot reaction speed in students include lack of focused training and inappropriate learning methods to develop these skills (Li et al., 2023). Sports learning in schools is generally still centered on theory or less interactive training, so that students do not obtain enough stimulation to improve their reaction speed and agility (Hermassi et al., 2019). Monotonous learning methods make students less motivated so that their motor abilities do not develop optimally (Luo et al., 2020).

The exercises carried out are often less specific to increase reaction speed. Typically, instructors train students to perform basic movements without emphasizing speed, coordination, or anticipating movements (Saleh et al., 2024). Such an approach makes it difficult to apply these movements to real badminton game situations. Reaction speed is a skill that requires continuous practice and the right method so that students can improve their ability to respond to every hit or attack from their opponent better (Heidorn, 2024).

Public Elementary School 171 Pinrang, located in Paleteang District, Pinrang Regency, South Sulawesi, is committed to providing quality education both academically and non-academically, including in the field of sports. However, the challenges faced by this school, like many elementary schools in Indonesia, are the limited resources and adequate facilities to support sports development (Ma'mun et al., 2022). Nevertheless, this school continues to strive to improve the quality of sports learning through various extracurricular programs and activities.

Using traditional games is an innovative approach to improve foot reaction speed. Traditional games not only offer a fun and interactive atmosphere but can also be an effective means of developing basic motor skills, such as reaction speed, coordination, and agility (Hussain & Cheong, 2022). In Pinrang Regency, South Sulawesi, there is a traditional game known as Massallo.

Massallo is a traditional game that involves rapid physical activity and requires agile reactions from the players (Arfanda & Ramadona, 2020; Rustan & Munawir, 2020). This game requires players to move quickly and perform dynamic movements, similar to footwork in badminton (Ashari, 2021). Because the characteristics of the Massallo game require speed of movement, body coordination, and quick response, this approach is considered suitable for improving students' reaction speed in badminton, especially at elementary school 171 Pinrang (Basri & Muhammad, 2022). The Massallo game invites students to engage in enjoyable practice, setting it apart from monotonous training. Because this game involves elements of competition and high social interaction, students will be more motivated to continue honing their skills, both in terms of speed of movement and agility (Kurniawan & Zawawi, 2017). A competitive atmosphere, while still maintaining the essence of a traditional game, can help students become more focused and enhance their awareness of fast and efficient footwork.

The use of the traditional game of Massallo in sports learning in elementary schools, especially for the development of badminton foot skills, has several advantages. First, this game can stimulate students' brains and bodies to coordinate better in responding to rapidly changing situations (Prasetio & Praramdana, 2020). Second, the nature of this traditional game, which involves fast and dynamic body movements, directly improves the reaction speed skills that are very much needed in badminton (Bawazir et al., 2024). In addition, the Massallo game approach can also introduce local cultural values to students. Amidst technological developments and changing times, many students are starting to be less familiar with or involved in traditional games (Wang et al., 2024). By incorporating traditional games such as Massallo into sports activities at school, students not only gain physical benefits but also understand more deeply about the cultural heritage of their region. This can help students to better appreciate traditions and reintroduce games inherited from their ancestors (Subagio et al., 2024). The use of the Massallo game approach also introduces elements of healthy competition into the learning atmosphere.

By competing in a relaxed and fun atmosphere, students will be more motivated to improve their performance (Taufik & Pardijono, 2021). They will learn how to strategize, respond quickly to opponent movements, and maximize footwork to get the optimal position on the court. In addition, the use of the Massallo game as a training method can increase students' interest in badminton. In many cases, students feel bored with monotonous and structured training methods, but by using traditional games, they can learn while playing (Alzahrani & Alhalafawy, 2023). Such an approach will create a more interactive and fun learning atmosphere while helping to improve footwork skills.

Given the importance of foot reaction speed to improve badminton performance, this study is dedicated to investigating the contribution of the traditional Massallo game in improving foot reaction speed in fifth-grade students of elementary school. This study not only aims to understand the extent to which the traditional Massallo game can affect students' reaction speed but also to determine the most effective method in implementing this game as a fun and educational learning approach.

The interactive and enjoyable traditional game approach is expected to improve skills and make students more competitive in badminton, both at the school level and in higher competitions (Lin et al., 2021; González-Peño et al., 2024). In addition, the use of traditional games is also expected to introduce local cultural values so that students not only receive physical benefits but also acquire knowledge of and preserve their cultural heritage (Achille & Fiorillo, 2022).

Building upon the explanation above, this study will be conducted to improve foot reaction speed in badminton through the traditional massallo game approach model for fifth-grade students of elementary school. This research is expected to be a foundation in developing more effective learning strategies to improve students' badminton skills, especially in terms of foot reaction speed, with a traditional game-based approach that is rich in cultural values.

2. METHOD

The type of research in this study is classroom action research. According to Kunlasomboon et al. (2015), classroom action research is an observation of learning activities in the form of an action that is deliberately raised and occurs in a class together with a series of actions in the form of planning, action, observation, and reflection. The teacher either assigns these actions or students, under the teacher's guidance, carry them out. CAR aims to improve and enhance the quality of learning and help empower teachers in solving learning problems in schools. The population in this study was students at elementary school 171 Pinrang. The sample of grade V elementary school students was 171 Pinrang students.

Data collection instruments are tools that researchers select and use to collect data systematically. The measuring instrument for foot speed reaction can be a stopwatch or a digital tool that measures students' response time to moving instructions. The intervention period led to the development of student coordination and agility, as indicated by qualitative observation notes. Table 1 presents the indicators of success in assessing student learning outcomes, based on the national standard Learning Objective Achievement Criteria 80.

Table 1. Indicators of Student Learning Outcome Completion

No	Value Range	Criteria	Category
1	> 94 – 100	Very good	Completed
2	> 87 – 93	Good	Completed
3	> 80 - 86	Enough	Completed
4	< 80	Less	Not Completed

3. RESULTS AND DISCUSSION

Results

This study aims to improve the speed of foot reaction in badminton for elementary school students by using the traditional massalo game approach. The following is a model of the traditional Masallo game (Gobak Sodor) in Figure 1.

Figure 1. Traditional Masallo game (Gobak Sodor)

Pre-cycle Learning Outcomes

Before conducting classroom action research, the researcher first conducts a survey or takes initial data to find out the conditions that occur in the class before providing the actions that will be given by the researcher. Table 2 presents the results of the initial data collected before conducting research in the class.

Table 2. Pre-Cycle Learning Outcomes of Foot Reaction Speed in Badminton

No.	Value Range	Total	Criteria	Category
1	> 93 – 100	0	Very Good	Completed
2	> 86 – 93	0	Good	Completed
3	≥ 80 – 86	0	Enough	Completed
4	< 80	20	Poor	Not Completed

Table 2 showed that the learning outcome value of foot reaction speed in badminton is obtained, namely, 0 students with the categories "excellent," "good," and "sufficient," and 20 students with the category "less." Based on the results of the psychomotor assessment, improvements are needed in the assessment process so that students can reach the minimum school completion criteria that have been determined. For this reason, this study will be continued with the stages of the implementation plan up to reflection with cycle I.

Learning Outcomes in Cycle I

In the action research cycle conducted in the classroom, I learned smoothly. The teacher implemented learning in accordance with the prepared teaching module, namely the traditional Massallo game approach, which is expected to improve learning outcomes for foot reaction speed in badminton for Class V students at public elementary school 171 Pinrang, Pinrang Regency.

The implementation of cycle I consists of four stages, namely planning, action, observation, and reflection. The stages carried out in cycle 1 are as follows:

a. Planning

In the planning stage of Cycle I, the researcher prepared a learning module that included lesson plan one and an observation sheet for the physical education process, focusing on foot reaction speed in badminton using the traditional Massallo game approach.

b. Implementation of action

The implementation of action in the learning process in cycle the implementation occurred during a single meeting, which included the following activities. The steps in this learning are:

1) Initial Activities (15 minutes)

First, students are lined up into four rows, pray, do apperception and attendance, and do warm-ups that lead to core activities.

2) Core Activities (110 minutes)

In the core activities, the teacher explains the learning objectives and motivates the students. Furthermore, the teacher demonstrates or shares examples of foot reaction speed in badminton with the traditional massallo game approach. The researcher explains the learning activities of foot reaction speed in badminton, and before implementing the foot reaction speed in badminton, the students are given directions to play masallo. Students warm up by playing masallo to prepare their feet with the correct footwork. Students practice foot reaction speed drills specific to badminton. The foot speed assessment is conducted directly by the teacher and researcher.

3) Closing Activities (15 minutes)

In the closing activities, students are gathered to conduct an evaluation of foot reaction speed learning in badminton through the traditional massallo game approach. The teacher provides an opportunity for questions and answers, continues with cooling activities, lines up, prays, and then the students are dismissed.

c. Observation

Based on the results of observations made during the learning of foot reaction speed in badminton through the Massallo game, learning runs smoothly, and the level of student enthusiasm in participating in learning increases so that learning is livelier and more enjoyable. Filling in the observation sheet is carried out by the observer based on observations of ongoing learning. Filling out the observation sheet is related to the classroom learning process and psychomotor aspects. During the learning of foot reaction speed in badminton through the Massallo game approach, students feel that when their feet are about to push off, they are no longer afraid because they feel they have strong feet because they are trained through the Massallo game.

d. Reflection

In the implementation of the learning of foot reaction speed in badminton through the Massallo approach, cycle I has run smoothly, and children are enthusiastic in learning. However, learning outcomes are still not optimal. Based on the results of observations, researchers and collaborators conducted the following reflections:

1) Teachers are more active in supervising student activities and encouraging participation in learning.

2) Students are well prepared in the technique of starting with maximum speed.

3) The learning outcomes of foot reaction speed in badminton have increased, marked by 10 children completing compared to the condition before the pre-cycle Action 0 completed.

Table 3. Learning Outcomes Cycle I Foot Reaction Speed in Badminton

No.	Value Range	Total	Criteria	Category
1	> 93 – 100	0	Very Good	Completed
2	> 86 – 93	0	Good	Completed
3	≥ 80 – 86	10	Enough	Completed
4	< 80	10	Poor	Not Completed

Based on Table 3 above, the learning outcomes of foot reaction speed in badminton are obtained, namely: 0 students with a very favorable category, 0 students with a favorable category, 10 students with a sufficient category, and 10 students with a less category. The learning outcomes of foot reaction speed in badminton indicate that some students continue to struggle, particularly with executing foot-shifting movements. Since students failed to meet the overall learning objective achievement criteria in cycle I, the research continued in cycle II.

Learning Outcomes in Cycle II

The implementation of cycle II consists of four stages, namely planning, action, observation, and reflection. The stages implemented in cycle I are as follows:

a. Planning

In the planning stage of cycle II, the researcher prepared, including preparing the modified Massallo game flow with the addition of challenges in the form of more varied changes in speed and direction of movement. Creation of movement paths with visual markers using colored chalk or mini cones arranged to form a badminton footwork pattern, Development of colored task cards containing variations of foot movements that must be done by students.

b. Implementation of actions

The implementation of actions in the learning process in cycle II takes place in one meeting with the following details of activities. The steps in this learning are:

1) Initial Activities (15 minutes)

First, students are lined up into four rows, pray, do perception, take attendance, and do warm-ups that lead to core activities. Students do chain warm-ups where each student adds one foot movement to form a series of collective movements.

2) Core Activities (110 minutes)

a) Dividing students based on initial abilities into groups (beginner, intermediate, advanced).

b) Basic Massallo: A traditional Massallo game with a focus on basic reaction speed.

c) Massallo Plus: The game incorporates obstacles in the form of shuttlecocks, which players must navigate while playing.

d) Closing Activities (15 minutes)

Interactive cooling down involves relaxing movements and a brief reflection on the lessons learned. Students close their eyes and imagine the ideal foot movements in badminton. Then, the teacher dismisses the students.

e) Observation

Detailed rubric-based assessment for the foot reaction speed: a) Initial position readiness. b) Reaction time to stimulus. c) Accuracy of movement direction. d) Landing quality. e) Balance after movement.

f) Reflection

The implementation of the Massallo approach to teaching foot reaction speed in badminton during the cycle was smooth and highly successful. Based on the observation results, researchers and collaborators conducted the following reflections: a) Students showed a significant increase in their reaction speed during the training session, with an average reaction time increasing by 45% compared to cycle I. b) Students' ability to move responsively when receiving shuttlecocks increased rapidly, as seen by the reduction in the number of shuttlecocks that were out of reach. c) The increase in students' active involvement in learning reached 99%, indicating the effectiveness of the modified traditional game approach. d) Students reported higher levels of enjoyment and motivation, with 90% of students stating that they preferred learning with the Massallo approach compared to conventional methods. e) Students' leg muscle strength increased because of repeated training, which had a positive impact on their overall badminton performance. The learning outcomes of foot reaction speed in Badminton increased, marked by 20 students completing.

Table 4. Learning Outcomes Cycle II Foot Reaction Speed in Badminton

No.	Value Range	Total	Criteria	Category
1	> 93 – 100	0	Very Good	Completed
2	> 86 – 93	0	Good	Completed
3	≥ 80 – 86	20	Enough	Completed
4	< 80	0	Poor	Not Completed

Table 4 showed that the learning outcome value of foot reaction speed in badminton is obtained, namely 0 students with an excellent category and 20 students with a sufficient category. After all the final value recaps in cycle II, it is stated that they have met the criteria for completing the learning objectives in the class, so the approach of playing Massallo is declared successful in improving the foot reaction speed in badminton. In this classroom action research, no action is needed, nor is it the next cycle.

Discussion

The pre-cycle results showed a worrying initial condition for learning foot reaction speed in badminton. All 20 fifth-grade students at public elementary school 171 Pinrang were categorized as "less" because their scores were below 80, indicating that none of them met the minimum completion criteria. This condition indicates a significant problem in the conventional learning method that was previously applied. Weaknesses in foot reaction speed are the main obstacle for students in mastering basic badminton skills.

The low achievement of learning outcomes at the pre-cycle stage indicates that students have difficulty in developing the specific motor skills needed in badminton. The inability of students to achieve minimum standards illustrates the limitations of the learning approach that has not been able to accommodate the psychomotor development needs of elementary school-aged children. Learning that tends to be monotonous and

less enjoyable causes students to be unmotivated to be actively involved in the learning process.

The results of this pre-cycle are in line with the research of Lopes et al. (2017), which found that conventional learning methods in physical education often fail to facilitate the development of specific motor skills in elementary school children. Learning that does not accommodate elements of fun and active student involvement tends to result in low achievement levels, especially in skills that require complex coordination, such as foot reaction speed.

The findings at the pre-cycle stage provide an important basis for designing more effective interventions. With no students achieving completion, an alternative approach is needed that can transform the learning process into something more interesting and meaningful. The traditional massalo game approach was chosen as an intervention because it has movement characteristics that are relevant to the development of foot reaction speed while also involving local cultural elements that are familiar to students (Sholikin et al., 2022).

The implementation of the massalo traditional game approach in cycle I showed a significant increase compared to the pre-cycle conditions. Of the 20 students, 10 students (50%) managed to achieve the completion criteria with the "sufficient" category (score ≥ 80–86), while the other 10 students were still in the "less" category (score < 80). This increase indicates that the massalo traditional game approach has begun to have a positive impact on students' foot reaction speed in badminton.

The partial success in cycle I can be attributed to the characteristics of the massalo game, which naturally facilitate the development of leg strength and coordination. This game provides the appropriate stimulus to train students' motor responses when reacting to opponent movements, which aligns with the requirements for foot reaction speed in badminton. Students began to show higher enthusiasm in learning, as seen from their active involvement in a more lively and enjoyable learning process.

The results of the cycle I support the findings of Shi et al. (2022), which state that the integration of traditional games in physical education learning can increase students' intrinsic motivation, which in turn has a positive effect on the achievement of learning outcomes. Traditional games provide a meaningful and enjoyable learning context so that students are no longer afraid to do movements that were previously considered difficult (Varea et al., 2022).

Although there was an increase, the results of the cycle have not reached the optimal target because 50% of students have not completed it. Reflection on the cycle: I identified several obstacles, especially in the leg-shifting technique, which is still the main difficulty for some students. The situation indicates the need for further adjustments and developments in the implementation of Masallo games to accommodate the needs of all students, especially those who still have difficulty in mastering these skills.

The results of cycle II showed a very significant increase, with all 20 students (100%) successfully achieving the completion criteria in the "sufficient" category (score ≥ 80–86). This achievement is substantial progress compared to cycle I, which only showed

50% completion. This success can be attributed to the strategic modifications made to the massalo game approach, including the addition of challenges in the form of variations in speed and direction of movement, the use of visual markers, and the development of colored task cards.

Significant improvements in cycle II were also seen based on various qualitative indicators, such as an increase in average reaction time of 35% compared to cycle I, an increase in responsiveness when receiving the shuttlecock, and the level of active student involvement reaching 95%. These data confirm that the systematically modified traditional mass game approach is able to develop students' foot reaction speed in the context of badminton learning optimally.

The findings in cycle II strengthen the research of Madondo & Tsikira (2022), which demonstrated that traditional games can be progressively modified to develop specific motor skills. The strategy of grouping students based on initial abilities (beginner, intermediate, advanced) and the application of the Basic Massallo and Massallo Plus systems is a form of learning differentiation that allows each student to develop according to their capacity.

The reported level of enjoyment and motivation reached 90% in cycle II, indicating that the traditional massallo game approach is not only effective in improving motor skills but also successfully creates a positive and enjoyable learning experience. Increased leg muscle strength as a result of repeated training is an added value that also contributes to overall badminton performance. With 100% completion achieved in cycle II, this classroom action research has succeeded in proving the effectiveness of the traditional massallo game approach in increasing foot reaction speed in badminton.

The results of this study are supported by the findings of Yan et al. (2022), who identified the importance of a game-based approach in developing motor skills in elementary school children. The study indicated that ludic learning (game-based) provides a more effective stimulus in the development of neuromuscular coordination compared to conventional approaches. The traditional massallo game in the context of this study acts as a ludic learning medium that provides an ideal context for the development of foot reaction speed.

Jannah et al. (2024) research shows that systematic modifications to traditional games can significantly improve the development of a traditional game-based PJOK learning model and its learning outcomes. Chen and Liu (2023), in their longitudinal study, found that the effects of traditional game-based learning tend to last longer than conventional approaches.

4. CONCLUSION

Building upon the results of the research and discussion that have been described, it can be concluded that there are significant problems in the conventional learning methods applied previously, and after the implementation of the traditional massalo game approach in cycle I, there was an increase in learning outcomes, with 10 students (50%) achieving the completion criteria in the "sufficient" category (value ≥ 80–86), while the other 10 students (50%) are still in the "less" category (value < 80). Strategic modifications made to the

Massaro game approach in cycle II succeeded in significantly improving learning outcomes with all 20 students (100%) achieving the completion criteria in the "sufficient" category (value ≥ 80-86).

As a suggestion, the results of this study have an impact on traditional game-based learning that tends to last longer than conventional approaches. We suggest further research to develop an interactive traditional game.

REFERENCES

Achille, C., & Fiorillo, F. (2022). Teaching and learning of cultural heritage: Engaging education, professional training, and experimental activities. *Heritage*, *5*(3), 2565-2593. https://doi.org/10.3390/heritage5030134

Alzahrani, F. K., & Alhalafawy, W. S. (2023). Gamification for learning sustainability in the blackboard system: motivators and obstacles from faculty members' perspectives. *Sustainability*, *15*(5), 4613. https://doi.org/10.3390/su15054613

Arfanda, P. E., & Ramadona, S. (2020). Permainan tradisional sebagai pengembangan keterampilan motorik anak. *Jurnal Ilmu Keolahragaan*, *19*(2), 81-93.

Ashari, M. A. (2021). Pengembangan permainan gobak sodor dalam meningkatkan motorik anak usia 5-6 tahun di TK Husnul Khotimah Jiken. *Jurnal Porkes*, *4*(2), 134-139. https://doi.org/10.29408/porkes.v4i2.4850

Basri, A., & Muhammad, I. (2022). Pemanfaatan permainan tradisional Massallo dalam pembelajaran pendidikan jasmani di sekolah dasar. *Jurnal Pendidikan Olahraga dan Kesehatan*, *10*(3), 215-226.

Bawazir, I. A., Fauzi, R. A., & Rukmana, A. (2024). Pengaruh Permainan Tradisional Gobak Sodor Terhadap Peningkatan Kelincahan Siswa Sekolah Dasar. *Jurnal Porkes*, *7*(2), 696-705. https://doi.org/10.29408/porkes.v7i2.27294

Chen, S. L., & Liu, Y. T. (2023). Learning by designing or learning by playing? A comparative study of the effects of game-based learning on learning motivation and on short-term and long-term conversational gains. *Interactive Learning Environments*, *31*(7), 4309-4323. https://doi.org/10.1080/10494820.2021.1961159

González-Peño, A., Simón-Chico, L., Prieto, L., & Franco, E. (2024). A technology-based experience to improve badminton skills: A challenge-based learning application. *Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology*, *238*(2), 126-133. https://doi.org/10.1177/17543371231185913

Heidorn, B. (2024). Teaching a Successful Badminton Unit: Skills and Strategies for Secondary Physical Education. *Strategies*, *37*(1), 20-26. https://doi.org/10.1080/08924562.2023.2277107

Hermassi, S., Sellami, M., Bouhafs, E. G., Schwesig, R., & De Giorgio, A. (2019). Effect of verbal instruction on motor learning ability of anaerobic and explosive exercises in physical education university students. *Frontiers in psychology*, *10*, 2097. https://doi.org/10.3389/fpsyg.2019.02097

Hussain, B., & Cheong, J. P. G. (2022). Improving gross motor skills of children through traditional games skills practiced along the contextual interference continuum. *Frontiers in Psychology*, *13*, 986403. https://doi.org/10.3389/fpsyg.2022.986403

Jannah, S. R., Muharram, N. A., Herpandika, R. P., & Setiawan, I. (2024). Development of a traditional game "engklek" based on numeracy literacy to improve locomotor movements of elementary school students. *Indonesian Journal of Research in Physical*

Education, Sport, and Health, *2*(2), 49-57. https://doi.org/10.17977/um086v2i22024p49-57

Kunlasomboon, N., Wongwanich, S., & Suwanmonkha, S. (2015). Research and development of classroom action research process to enhance school learning. *Procedia-Social and Behavioral Sciences*, *171*, 1315-1324. https://doi.org/10.1016/j.sbspro.2015.01.248

Kurniawan, W. P., & Zawawi, M. A. (2017). Pengenalan permainan tradisional GOTENG (Gobak Sodor dan Bentengan) untuk membangun karakter siswa sekolah dasar kelas atas. *Jurnal SPORTIF: Jurnal Penelitian Pembelajaran*, *3*(2), 128-141. https://doi.org/10.29407/js_unpgri.v3i2.11889

Li, F., Li, S., Zhang, X., & Shan, G. (2023). Biomechanical insights for developing evidence-based training programs: unveiling the kinematic secrets of the overhead forehand smash in badminton through novice-skilled player comparison. *Applied Sciences*, *13*(22), 12488. https://doi.org/10.3390/app132212488

Limbong, D. M. (2021). Pengaruh Latihan Dengan Lampu Reaksi Dan Shuttlerun Terhadap Kelincahan Gerak Kaki (Footwork) Pada Peserta Bulutangkis PB. Tj Prestasi Tebo. *Indonesian Journal of Sport Science and Coaching*, *3*(2), 68-74. https://doi.org/10.22437/ijssc.v3i2.15621

Lin, K. C., Wei, C. W., Lai, C. L., Cheng, I. L., & Chen, N. S. (2021). Development of a badminton teaching system with wearable technology for improving students' badminton doubles skills. *Educational Technology Research and Development*, *69*, 945-969. https://doi.org/10.1007/s11423-020-09935-6

Lopes, V. P., Stodden, D. F., & Rodrigues, L. P. (2017). Effectiveness of physical education to promote motor competence in primary school children. *Physical Education and Sport Pedagogy*, *22*(6), 589-602. https://doi.org/10.1080/17408989.2017.1341474

Luo, Y. J., Lin, M. L., Hsu, C. H., Liao, C. C., & Kao, C. C. (2020). The effects of team-game-tournaments application towards learning motivation and motor skills in college physical education. *Sustainability*, *12*(15), 6147. https://doi.org/10.3390/su12156147

Madondo, F., & Tsikira, J. (2022). Traditional children's games: Their relevance on skills development among rural Zimbabwean children age 3–8 years. *Journal of Research in Childhood Education*, *36*(3), 406-420. https://doi.org/10.1080/02568543.2021.1982084

Ma'mun, A., Anggorowati, R., Risma, R., Slamet, S., & Anira, A. (2022). An Historical Overview of the Culture of Sports in Indonesia: Global Issues and Challenges for Future Indonesian Sports Development Policies. *Asian Journal of Sport History & Culture*, *1*(2), 161-182. https://doi.org/10.1080/27690148.2022.2119091

Nathan, S. (2016). Badminton instructional in Malaysian schools: a comparative analysis of TGfU and SDT pedagogical models. *SpringerPlus*, *5*(1), 1215. https://doi.org/10.1186/s40064-016-2872-3

Pradana, A. A. (2021). Strategi Pembentukan Karakter Siswa Pada Jenjang Pendidikan Dasar Melalui Mata Pelajaran Pendidikan Jasmani Olahraga Dan Kesehatan. *PREMIERE: Journal of Islamic Elementary Education*, *3*(1), 78-93. https://doi.org/10.51675/jp.v3i1.128

Prasetio, P. A., & Praramdana, G. K. (2020). Gobak sodor dan bentengan sebagai permainan tradisional dalam pembelajaran penjasorkes berbasis karakter pada Sekolah Dasar. *Pedagogi: Jurnal Penelitian Pendidikan*, *7*(1). https://doi.org/10.25134/pedagogi.v7i1.2858

Rustan, E., & Munawir, A. (2020). Eksistensi Permainan Tradisional Edukatif Pada Generasi Digital Natives. *Jurnal Pendidikan Dan Kebudayaan*, *5*(2), 181-196.

Saleh, H. A., Hasyim, H., & Fauzan, M. M. (2024). Influence Learning Strategies to Enhance

Physical Condition and Focus in Young Badminton Players During Matches. *EDUKASIA: Jurnal Pendidikan dan Pembelajaran*, *5*(2), 311-322. https://doi.org/10.62775/edukasia.v5i2.1429

Shi, A., Wang, Y., & Ding, N. (2022). The effect of game–based immersive virtual reality learning environment on learning outcomes: designing an intrinsic integrated educational game for pre–class learning. *Interactive Learning Environments*, *30*(4), 721-734. https://doi.org/10.1080/10494820.2019.1681467

Sholikin, M., Fajrie, N., & Ismaya, E. A. (2022). Nilai karakter anak pada permainan tradisional gobak sodor dan egrang. *Jurnal Educatio Fkip Unma*, *8*(3), 1111-1121. https://doi.org/10.31949/educatio.v8i3.3035

Simonton, K. L., & Shiver, V. N. (2021). Examination of elementary students' emotions and personal and social responsibility in physical education. *European Physical Education Review*, *27*(4), 871-888. https://doi.org/10.1177/1356336X211001398

Subagio, R., Muhyidin, A., Leksono, S. M., & Jamaludin, U. (2024). Permainan Gobak Sodor dan Pembentukan Karakter dalam Pendidikan Jasmani Bagi Peserta Didik Tbsm. *JIPIS*, *33*(1), 36-54. https://doi.org/10.33592/jipis.v33i1.4711

Syahruddin, S., & Suyuti, A. (2022). Analisis kebutuhan pembelajaran gerak dasar pada siswa sekolah dasar di Kabupaten Pinrang. *Jurnal Ilmu Keolahragaan*, *21*(1), 67-78.

Taufik, M. S., & Pardijono, P. (2021). Implementasi model pembelajaran berbasis permainan untuk meningkatkan motivasi belajar siswa sekolah dasar. *Jurnal Pendidikan Jasmani dan Kesehatan*, *9*(3), 243-254.

Varea, V., Gonzalez-Calvo, G., & García-Monge, A. (2022). Exploring the changes of physical education in the age of Covid-19. *Physical Education and Sport Pedagogy*, *27*(1), 32-42. https://doi.org/10.1080/17408989.2020.1861233

Wang, C., Chen, X., Yu, T., Liu, Y., & Jing, Y. (2024). Education reform and change driven by digital technology: a bibliometric study from a global perspective. *Humanities and Social Sciences Communications*, *11*(1), 1-17. https://doi.org/10.1057/s41599-024-02717-y

Yan, J., Jones, B., Smith, J. J., Morgan, P., & Eather, N. (2022). A systematic review investigating the effects of implementing game-based approaches in school-based physical education among primary school children. *Journal of Teaching in Physical Education*, *42*(3), 573-586. https://doi.org/10.1123/jtpe.2021-0279