JPES 14 (4) (2025)

Journal of Physical Education and Sports

http://journal.unnes.ac.id/sju/index.php/jpes

Development Of A Physical Education Learning Model For Badminton Using the Sport Education Model Approach to Improve Learning Outcomes of Junior High School Students

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Article Info

History Articles
Received:
July 2025
Accepted:
July 2025
Published:
December 2025

Keywords:
Physical Education, Sport Education Model, Badminton, Learning Development.

Abstract

This research is based on the problem, including the low learning outcomes of badminton material. This research aims to: (1) analyze the development of physical education learning of badminton material using the sport education model approach for junior high school students. (2) Analyze the feasibility of physical education learning of badminton material using the sport education model approach for junior high school students. (3) Analyze the effectiveness of physical education learning of badminton material using the sport education model approach for junior high school students. This research method uses R&D Brog and Gall. Small-scale trials were implemented on 30 students and large-scale trials on 60 grade IX students. Data analysis includes feasibility tests, student response tests, effectiveness tests, and paired tests. The study results are as follows: (1) expert validation one feasibility percentage 88%, expert validation two feasibility percentage 98%, and expert validation three feasibility percentage 81%. (2) small-scale results of paired tests, sig 0.00 <0.05 (significant), effect size 0.8 (large). (3) large-scale paired sig test 0.00<0.05 (significant) and effect size 1.4 (extensive) Based on the results of data analysis, the physical education learning product of badminton material with a sports education model approach for junior high school students is declared feasible. This learning product can help teachers in the teaching and learning process of junior high school physical education. Based on the results of data analysis, the physical education learning product of badminton material with a sport education model approach for junior high school students is declared feasible. It can support teachers in the teaching and learning process of PJOK junior high school.

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p-ISSN 2252-648X
e-ISSN 2502-4477

INTRODUCTION

To achieve golden Indonesia 2045, accelerating human resource (HR) development is crucial. Quality human resources can be attained through education, making education a key driver in Indonesia national development process (Pramono et al., 2023). Based on this, the education process must align with UU No. 16 of 2022 concerning process standards for early childhood education, primary education, and secondary education. Therefore students should develop strong motivation to learn, as well as a positive attitude toward their surroundings, as school plays a vital role in shaping their self-awareness. Additionally, school serves as a place to instill good behavior in students, ensuring they adhere to established rules and social norms (Yuniati et al., 2017)

Physical education, sport, and health (PJOK) is a compulsory subject in Indonesia national education curriculum, implemented across all levels and types of education. Physical education is an integral part of holistic development, emphasizing physical activity and healthy living to foster physical, mental, social and emotional growth in a balanced and harmonious manner (Setiawan et al., 2019). Physical education, sports, and health (PJOK) play a vital role in promoting overall well-being and social development (Raharjo & Kusuma, 2025). By strengthening community ties and fostering meaningful relationships among families and peers, PJOK helps cultivate a sense of belonging and acceptance. It also encourages positive social attitudes and behaviors while uniting people from diverse cultural, social, and economic backgrounds toward shared goals and common interests (Rahman et al., 2024).

Badminton is one of the most popular and widely enjoyed sports in Indonesia (Budiharjo & Raharjo, 2023). This racquet sport is played using specialized equipment including a racket, net, and shuttlecock. Played can compete in either singles matches (one versus one) or doubles matches (two pairs facing off). The fundamental objective of the game is to strategically land the shuttlecock in the opponent's court while simultaneously preventing it from touching the ground on one's own side, with the playing area divided by a net (Amarta & Raharjo, 2021). To play effectively, six essential techniques: the serve, lob, dropshot, smash, drive, and net shot, each requiring precise execution and tactical application during matches (Rinaldi, 2020).

In school physical education programs, small ball sports like badminton are taught to help students understand and practice the game. However, the teaching and learning process of badminton faces several persistent challenges across schools. A significant issue is students' lack of motivation to participate, with common excuses being hot weather, fatigue, and perceived boredom, rather the than engaging in activities, many students prefer to socialize at the sidelines of the court. The implementation of badminton in physical education at junior high schools shows concerning results, particularly in Indramayu regency. Observational data reveals that learning outcomes remain substandard, with approximately 70% of students failing to meet the minimum criteria.

The consistently low achievement levels in badminton instruction present a critical issue that demands immediate evaluation of teaching and learning processes (Utaminingsih et al., 2023). If left unaddressed, this situation will continue to negatively impact students' skill development and overall competency (Cheng et al., 2023). To address teaching challenges in badminton instruction, adopting appropriate instructional models represents a fundamental solution (Fernandez-Rio & Iglesias, 2024), these models serve as the cornerstone for educational development, ensuring effective delivery of content and achievements of learning objectives.

The sport education model presents an effective solution to address various challenges in physical education instruction, particularly in badminton (Ginanjar et al., 2019b). This student-centered instructional model transforms traditional teaching by organizing learning through sport competition frameworks (Ginanjar et al., 2019a). It comprehensively develops students' physical fitness, motor kills, critical thinking, social skills, emotional stability, moral reasoning, healthy lifestyle habits, and environmental awareness through carefully selected physical activities (Tendinha et al., 2021).

The models strength lies in creating authentic social contexts where students actively participate as both players and organizers (Bessa et al., 2019). Students gain valuable opportunities to make independent decisions regarding gameplay, strategies, and tactics while assuming various team roles that require social interaction and group collaboration (Farias et al., 2019). By structuring learning as seasonal sports competitions, the model naturally incorporates element of teamwork, responsibility, and sportsmanship (Philpot et al., 2024). Key benefits of this approach include enhanced student engagement through meaningful participation, development of both technical and tactical skills in realistic settings (Islam et al., 2025), and the cultivation of positive social behaviors through cooperative learning experiences (Harvey et al., 2020).

This instructional model places a strong emphasis on social dimensions, including responsibility, social interaction, interest, and sportsmanship (Bjørke & Mordal Moen, 2020). During the orientation phase, students are organized into groups based on their individual interests (Aoyagi et al., 2020). Throughout the season, they engage in collaborative practice sessions, often under the guidance of their peers (Albaloul et al., 2024). The competitive phase provides students with direct opportunities to explore and develop their talents, furthermore, the awarding of prizes at the end of the learning cycle fosters a sense of shared purpose, promoting solidarity and team work in striving toward common goals (Putra & Darmawan, 2025).

To examine the extent to which teacher understand and implement badminton instructional models, as well as to identify the obstacles that hinder the teaching and learning process, the researcher conducted a preliminary study involving physical education (PE) teachers from junior high schools (SMP/MTs) in Indramayu regency. The study revealed that 60% of the teachers reported low student motivation as a primary challenge, and an equal percentage were still using conventional teaching methods. Furthermore 70% of the teachers had not yet adapted their instruction to align with students interests notably 80% of the respondents were unfamiliar with the sport education model, and only 20% had implemented it in teaching. However 80% of the teacher expressed agreement with the development of a badminton –focused physical education program utilizing the sport education model to improve student learning outcomes.

Based on preliminary observations, the lack of awareness and the challenges in preparing sport education-based instructional materials have contributed to the limited implementation of sport education model in junior high schools. Furthermore, its application is often not aligned with the existing Indonesia curriculum due to time constraints within physical education sessions at school. Therefore, there is a need to develop a sport education model based learning approach that is compatible with the national curriculum and tailored to the developmental level of junior high school students.

METHODS

This study used Research and Development (R&D). is the conceptualized and implementation of new product ideas or the improvement of existing products (Abadi et al., 2024). The core objective of R&D activities is to quality and functionality. The development of a product is typically driven by the need to solve a problem, further refine an existing model, or realize an innovative idea for the creation of a new product (Sugiyono, 2019). This study focuses on the development of badminton learning suing the sport education model for junior high school students. The researcher chose the sport education model because if offers numerous benefits in physical education across cognitive, psychomotor, and affective domains. Its primary advantage lies in providing students with meaningful experiences related to the world of sports, while also fostering enthusiasm as they take on roles their align with their personal interests in sports. The research employs both qualitative and quantitative methods. The qualitative approach, through observations and interviews, is used to explore the phenomena occurring in the learning process. Meanwhile, the quantitative method aims to measure the effectiveness of the sport education model in improving student learning outcome in physical education at the junior high school level.

In this study, the research and development (R&D) approach was employed. In development-based research, the specific steps may vary depending on the context and conditions encountered by the researcher, and there is no requirement to follow a single standardized procedure. Based on this understanding, the following procedure was adopted for this study:

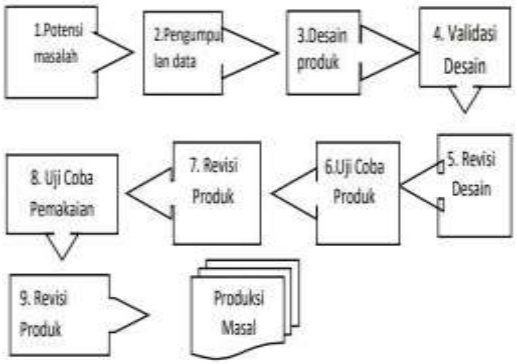


Figure 1. Steps to use the Research and Development Method (R&D)

In this study involved two main subjects. The first subject consisted of validators, including three experts: a learning expert, a badminton learning expert, and a physical education (PE) learning expert. The expert validators are as follows:

A learning expert: Dr. Agi Ginanjar, M.Pd.

A badminton learning: Lukman Al Hakim, M.Pd.

A physical education (PE) : Dudi Iswandi, M.Pd.

The second subject consisted of physical education teachers and a total of 90 students from two junior high schools: SMP Negeri 1 Jatibarang, indramayu Regency, West Java, and MTs Negeri 8 Indramayu, West Java.

The instruments in this study were designed to measure the effectiveness of the product in teaching physical education, specifically badminton material, using the sport education model approach for junior high school students. To assess learning outcomes, three aspects were evaluated: cognitive, affective, and psychomotor. The reliability of the cognitive instrument was 0.73, categorized as “high”; the affective instrument had a reliability of 0.90, also

categorized as "high"; and the psychomotor instrument had a reliability 0.70, categorized as "moderate".

The feasibility data from the questionnaires is processed based on the method described by (Sugiyono, 2019), as follows:

$$P2 = \frac{\sum X}{\sum X1} 100\%$$

Description

P2 : Feasibility percentage

∑x : Total obtained score

∑x1: Total ideal score for each item

100% : Constant

Table 1 Feasibility Criteria

No	Category	Percentage
1	Very Good	81%-100%
2	Good	61%-80%
3	Fair	41%-60%
4	Poor	21%-40%
5	Very Poor	0%-20%

The practicality criteria of the product were determined based on data obtained from the practicality test sheets completed by the students. The data on product practicality were processed using a questionnaire-based method as described (Sugiyono, 2019), as follows:

$$P = \frac{F}{N} x100\%$$

Description:

P : Practicality score percentage

F : Total obtained score

N : Ideal score

Table 2. Practicality percentage

No	Category	Percentage
1	Very Practical	81%-100%
2	Practical	61%-80%
3	Fairly Practical	41%-60%
4	Less Practical	21%-40%
5	VeryImpractical	0%-20%

The N-Gain analysis is used to identify the extent to which students' understanding improves after the learning intervention. The data were processed using the method described by (Hake, 1998), as follows:

$$\frac{(score\ prosttest - score\ pretest)}{(score\ maxsimal - pretest)}$$

Table 3. N-Gain category

No	Description	Category
1	If N-Gain > 0.7	High
2	If N-Gain 0.3 to < 0.7	Medium
3	If N-Gain < 0.3	Low

The method used to measure the effect size in this study was Cohen's d. Data analysis was carried out using the approach proposed by (Cohen, 2013), as follows:

$$Cohen'sd = \frac{(m_2 - m_1)}{\text{SD Pooled}}$$

Description

M1 = Mean of the pretest

M2= Mean of the posttest

SDpooled= Pooled standard deviation

Table 4. Cohen's d interpretation

Effect Size	Interpretation
0.8	Large
>0.5	Medium
0.2	Small

RESULTS AND DISCUSSION

In the development phase of this study, the researcher created a physical education learning product focusing on badminton, using the sport education model approach for phase D students. The product

includes several learning components: a eaching module, student worksheets (LKPD), and a textbook.

Figure 2. Product A Teaching Module

Figure 3. Product book

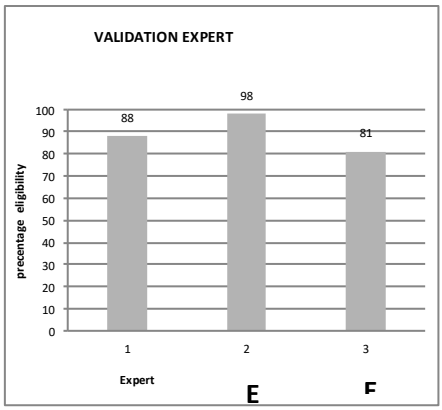
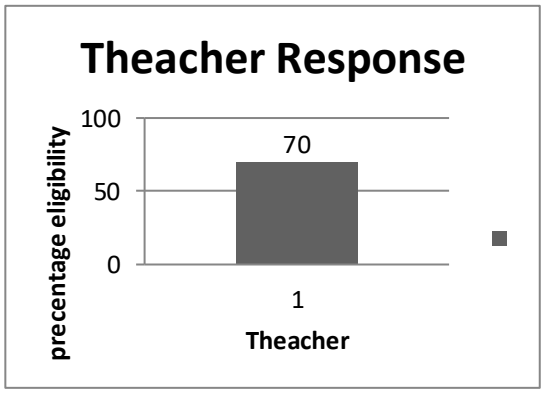


Figure 4. Validation Result From Expert

The result figure 4. Validation from Expert 1 showed a score percentage of 88%, which falls into the "highly feasible" category; however, revisions were made based on the suggestions provided. The validation result from Expert 2 showed a score percentage of 98%, also categorized as "highly feasible," with revisions made according to the feedback given. The This trial was conducted on a small scale, involving one teacher and 30 students from SMP Negeri 1 Jatibarang. The purpose was to implement the developed product, specifically a physical education learning module on badminton using the Sport Education Model approach. The trial was also conducted to gather feedback and suggestions regarding the weaknesses of the product developed by the researcher.



validation result from Expert 3 showed a score percentage of 81%, likewise categorized as "highly feasible," and revisions were made in response to the suggestions received. Overall, the average validation score from Experts 1, 2, and 3 was 89%, which indicates the product is "highly feasible," though revisions were still implemented based on the expert feedback.

Based on the results figure 5, the implementation of physical education learning on badminton using the Sport Education Model in the small-scale trial yielded a percentage of 70%, which falls into the "feasible" category. However, suggestions and feedback indicated that adjustments should be made to the learning meetings and assessment processes.

Student responses were collected using a Google Form distributed via WhatsApp to determine their perceptions after participating in physical education learning on badminton using the Sport Education Model approach to improve learning outcomes. The results are as follows:

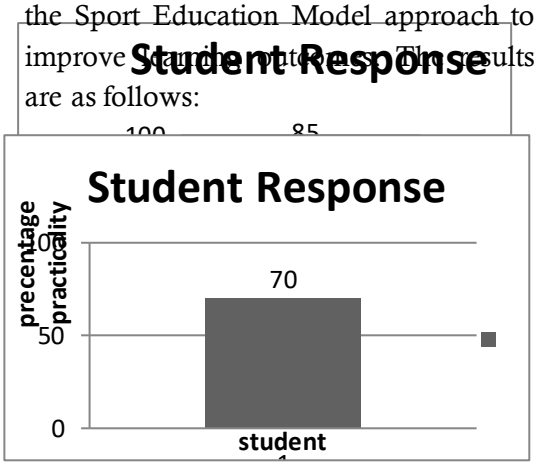


Figure 6. Student response

Based on the results figure 6, Student responses regarding the practicality of the physical education learning product on badminton using the Sport Education Model to improve learning outcomes, in the small-scale trial, resulted in a percentage score of 70%. Based on this result, the product falls into the “practical” category.

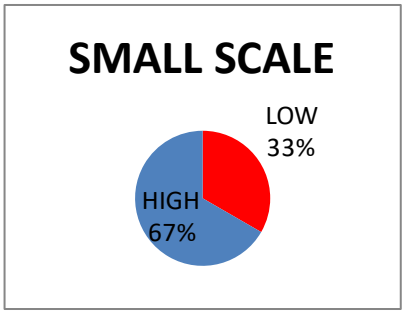


Figure 7. Learning outcome

Result figure 7 learning outcomes after using the product developed by the researcher namely, the physical education learning on badminton using the Sport Education Model showed that 67% of the students achieved high scores, while 33% obtained low scores.

Next, data analysis of the learning outcomes in this study was conducted using a paired sample t-test to determine whether there was a significant effect after the implementation of the learning intervention.

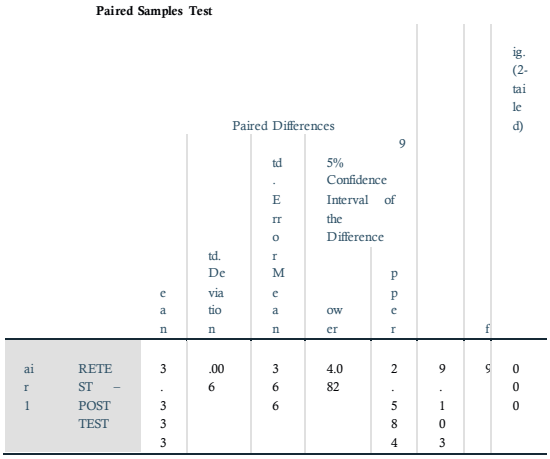


Figure 8. Paired Sample t-tast

The paired t-test was used to determine the significance of the difference between the pretest and posttest scores. Based on the results shown in Figure 8, the mean difference of -3.333 indicates that the posttest average score was higher, as a negative value signifies that the posttest score exceeded the pretest score. Furthermore, the t-value of -9.103 suggests a significant standard difference, indicating that a measurable change

occurred. The degrees of freedom (df) were 29, calculated by subtracting 1 from the sample size of 30. The significance value (sig) was 0.000, which is less than 0.05, indicating a statistically significant difference between the pretest and posttest scores. Based on these results, it can be concluded that the intervention had a positive impact on improving students' learning outcomes in badminton.

Subsequently, the effectiveness analysis in this study was conducted using the N-Gain test and Cohen's effect size test to determine the effectiveness of the learning intervention.

Table 5 Result N-Gain

Result N-Gain		
Sample	N-Gain	Category
30 student	0.2	Low

The N-Gain test was used to determine the improvement in the effectiveness of students' learning outcomes after the implementation of the instructional intervention, which in this study was physical education on badminton using the Sport Education Model approach. Based on the N-Gain analysis with a sample of 30 students, the score obtained was 0.2. According to the N-Gain interpretation criteria, this result falls into the "low" category.

Table 6 Result effect size cohen's

Result Effect size cohen's d			
Pretest posttest	SD Pool	Cohen's d	Category
	.53	.8	High

The effect size test (Cohen's d) was used to determine the magnitude of the impact of the physical education learning on badminton using the Sport Education Model approach. Based on the result table 6, presented above, the Cohen's d value was 0.8, which falls into the "large" category according to the effect size interpretation criteria. This indicates that the badminton learning using the Sport Education Model had a substantial effect on improving students' learning outcomes.

This stage aimed to conduct a large-scale trial of the product developed by the researcher and previously validated by experts. The large-scale trial involved two physical education teachers and 60 students: 30 from SMP Negeri 1 Jatibarang and 30 from MTs Negeri 8 Indramayu. The product being implemented was a physical education learning module on badminton using the Sport Education Model approach. The purpose of this trial was to gather feedback and suggestions regarding any weaknesses of the product. Teacher responses were collected through a questionnaire administered after the implementation, while student responses were collected via a Google Form questionnaire distributed through the class WhatsApp groups after the learning activities were completed.

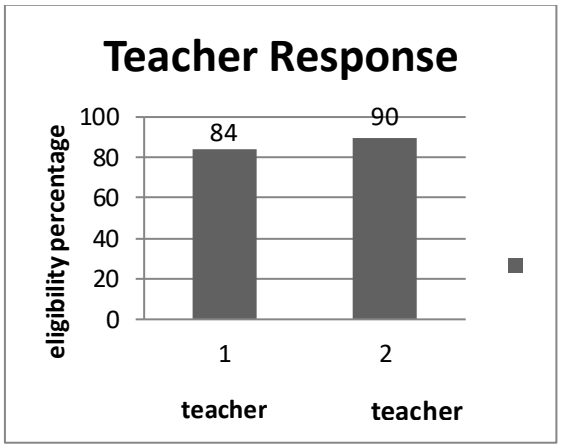


Figure 9. teacher response

Based on the results shown in Figure 9, the implementation of physical education learning on badminton using the Sport Education Model to improve learning outcomes in the large-scale trial received a percentage score of 84% from Teacher 1 and 90% from Teacher 2. These results fall into the "highly feasible" category.

Figure 10 Student response

Based on the results shown in Figure 10, the practicality of the physical education learning product on badminton using the Sport Education Model to improve learning outcomes in the large-scale trial reached a percentage of 85%. According to the criteria, this result falls into the "very practical" category.

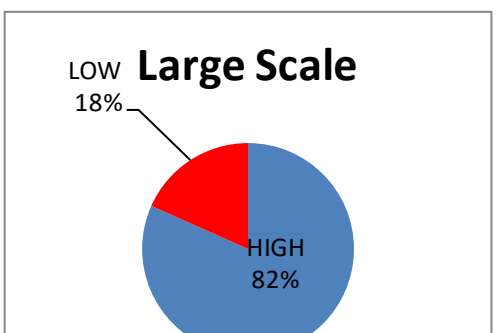


Figure 11. Learning outcome

Based on the results shown in Figure 11, the learning outcomes after using the product developed by the researcher namely, physical education learning on badminton using the Sport Education Model showed that 82% of the students achieved high scores, while 18% obtained low scores.

Next, data analysis of the learning outcomes in this study was conducted using a paired sample t-test to determine whether there was a significant effect after the implementation of the learning intervention.

Paired Samples Test

	Paired Differences						
			95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	f	Sig. (2-tailed)

air1	retest-Posttest	7.200	.262	550	8.301	6.099	13.086	9	000

Figure 12 paired samples test

The paired t-test was used to determine the significance of the difference or effect between the pretest and posttest scores. Based on the results shown in Figure 12, the mean difference of -7.200 indicates that the average posttest score was higher, as the negative value signifies that the posttest score exceeded the pretest score. Furthermore, the t-value of -13.086 suggests a significant standard difference, indicating that a measurable change occurred. The degrees of freedom (df) were 59, calculated by subtracting 1 from the total sample size of 60. The significance value (sig) was 0.000, and since 0.000 < 0.05, it indicates a statistically significant difference between the pretest and posttest scores. Based on these results, it can be concluded that there was a significant effect on the improvement of students' learning outcomes in badminton learning.

Table 7 Result N-Gain

Result N-Gain		
Sample	N-Gain	Category
60 student	0.3	Medium

The N-Gain test was used to determine the improvement in the effectiveness of students' learning outcomes after the implementation of the instructional intervention, which in this study was physical education learning on badminton using the Sport Education Model approach. Based on the N-Gain analysis with a sample of 60 students, the score obtained was 0.3. According to the N-Gain interpretation criteria, this result falls into the "moderate" category.

Table 8 Result effect size cohen's

Result Effect size cohen's d			
Pretest Posttest	SD Pool	Cohen's d	Category
	4.37	1.6	High

The effect size test (Cohen's d) was used to determine the magnitude of the effectiveness of the physical education learning on badminton using the Sport Education Model approach. Based on the results presented above, the Cohen's d value was 1.6, which falls into the "large" category according to the effect size interpretation criteria. This indicates that the badminton learning using the Sport Education Model had a strong effectiveness in improving students' learning outcomes.

DISCUSSION

Based on the results from the initial (small-scale) trial, the product was deemed feasible and practical. However, there were still suggestions for revision, particularly related to the number of meetings and the form of assessment. This is evident from the low N-Gain

score, which indicates that the overall improvement was still minimal. Although the paired t-test showed statistically significant results and the Cohen's effect size was large, individual learning gains remained low. This was likely due to the limited number of learning sessions, as also noted in the comments from the validation and feasibility questionnaires. Therefore, the researcher made revisions to the product before conducting the large-scale trial. In the large-scale trial, after revisions were made based on the small-scale findings, the statistical analysis again showed significant results through the paired t-test. The effect size also indicated a strong impact on learning effectiveness. Additionally, the N-Gain value improved to the "moderate" category, compared to the "low" category in the small-scale trial. This suggests that each student experienced a moderate improvement in their learning outcomes in badminton.

Therefore, physical education learning on badminton using the Sport Education Model improves the learning outcomes of junior high school students. This is because the learning process aligns with the Merdeka Curriculum, which incorporates differentiated instruction based on students' interests (Ginanjar et al., 2021). As a result, students are indirectly more motivated to learn, in line with the findings of. Furthermore, to prevent group formation based solely on the dominance of more active students, the implementation of the Sport Education Model in this study began with an initial diagnostic assessment to identify students' interests (Wijaya et al., 2024). This approach aligns with the purpose of Sport Education as stated by (Chu & Zhang, 2018) . In addition, learning through the Sport Education Model fosters continuous motivation to participate in physical education, which is consistent with the findings of (Albaloul et al., 2024). Regarding learning outcomes, there was a significant improvement particularly in the affective domain during the implementation of the Sport Education Model, a result that supports the findings of (Zhang et al., 2024).

ADVANTAGES

The implementation of the Sport Education Model in badminton learning offers several advantages. It improves students' learning outcomes, particularly in the affective domain, by fostering greater enthusiasm and engagement. This model aligns well with the Merdeka Curriculum through the application of differentiated instruction based on students' interests, which enhances their intrinsic motivation to learn. Additionally, the use of initial diagnostic assessments helps ensure balanced group formation, preventing domination by more active students and promoting inclusivity. Lastly, the continuous and structured nature of the Sport Education Model encourages sustained student participation and motivation throughout the learning process.

DISADVANTAGES

The implementation of the Sport Education Model also presents several disadvantages. One key limitation is the lack of adequate facilities, as not all necessary equipment and spaces are fully

available to support the learning process. Additionally, the tournament-based learning format, while promoting excitement and enthusiasm, often creates noise and crowding, which can disturb the learning environment of other nearby classes. These issues can reduce the overall comfort and effectiveness of the teaching and learning process, particularly in schools with limited infrastructure.

CONCLUSION

Based on the results of the research and data analysis, the following conclusions regarding the development can be drawn. Using the Borg and Gall development model, the researcher successfully developed a Sport Education-based learning product for badminton material tailored to junior high school students. This product consists of four main components: a theoretical foundation, learning syntax or stages, expert validation, and the learning impact. The final product was compiled and packaged in the form of a book. The physical education learning model using the Sport Education approach was found to be feasible in improving students' learning outcomes. It received a feasibility score of 70% in the small-scale trial, categorized as "feasible," and 87% in the large-scale trial, categorized as "very feasible." In terms of practicality, based on student responses, the model was rated as "practical" with a 70% score in the small-scale trial and "very practical" with an 85% score in the large-scale trial, suggesting that the model is appropriate for use in junior high schools. Regarding effectiveness, the model also proved to be impactful. The small-scale trial produced an effect size of 0.8, which falls into the "large" category, with a significance value of 0.00, indicating a significant effect. Likewise, the large-scale trial showed an even greater effect size of 1.4, also in the "large" category, with a significance value of 0.00, confirming the significant impact of the model.

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