15 (2) (2026) 1127-1139

Journal of Physical Education, Sport, Health and Recreations

http://journal.unnes.ac.id/journals/peshr

Development of The Gotang Game Model Towards Students' Active Participation of Class V Physical Education Learning

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Keywords

GOTANG Game; Active Participation; Physical Education

Abstract

This study aims to develop the GOTANG game model as an alternative for physical education learning to increase the active participation of fifth-grade elementary school students in Semarang City. This research is motivated by students' low interest in traditional games and limited facilities and infrastructure in learning large ball games, especially handball. This study used the Research and Development (R&D) method with the ADDIE model (analysis, design, development, implementation, and evaluation). Data collection was conducted through observation, interviews, and questionnaires. Data analysis used quantitative and qualitative descriptive analysis using the Guttman scale. A small-scale trial was conducted on 15 students from SDN Pakintelan 2, while a large-scale trial was conducted on 45 students from SDN Pakintelan 2 and Pakintelan 3. Product validation involved game experts and physical education experts. The results of the study are as follows: (1) The validation data according to experts is 97% in the sufficient category. (2) The results of small-scale trials were 92% with Good category, and (3) The results of large-scale trials were 90% in the Good category. The product resulting from this development is a model of the Gobak Sodor Bala Tangan (GOTANG) game that can be assembled and disassembled. The Gotang game has been declared suitable for use as a learning model for physical education materials in elementary schools.

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p-ISSN 2460-724X
e-ISSN 2252-6773

INTRODUCTION

Education has a very broad scope and reflects noble values. Education is not limited to formal channels but can also be obtained through informal channels. Formal channels take place in educational institutions such as schools, from early childhood education to higher education, which in the process involve the role of educators or teachers. Meanwhile, informal education is obtained through the family environment, especially from parents, who play a crucial role in shaping an individual's attitudes and character (Syaadah et al., 2022). Physical Education and Sports is an inseparable part of the overall education system which aims to develop physical fitness, motor skills, knowledge, sportsmanship, and social values through physical activities which are planned and implemented systematically (Purnomo et al., 2022).

Physical education is one of the core subjects required of all students. This subject differs from other subjects because the learning process involves more physical activity as a tool and medium for learning (Anwar et al., 2025). In practice, physical education utilizes a variety of equipment and requires a sufficiently large area to support the development of students' motor skills. Through these activities, students can improve and maintain their physical fitness while also developing healthy lifestyle habits that are useful in their daily lives (Sari et al., 2024). Thus, physical education plays a role as part of education that emphasizes the development of motor skills, knowledge, and behavior that supports healthy physical activity (Islam, 2025).

Physical education encompasses a wide range of activities, whether performed in pairs, teams, or groups. These activities are beneficial for developing motor skills and critical thinking skills, while also instilling important values such as sportsmanship, honesty, responsibility, discipline, and emotional management. All of these values can be instilled through physical education lessons, which essentially utilize physical activity as the primary tool. Furthermore, the goal of physical education is to optimize the overall quality of students. This is realized through physical education learning materials in elementary schools which are arranged in various forms of activities, such as gymnastics, rhythmic activities, movement development, water activities, injury prevention and treatment, as well as sports or game materials which can be done both individually and in groups (Tifal, 2023).

With its broad scope, physical education offers a variety of learning alternatives that teachers can implement according to the desired learning objectives. Throughout the learning process, teachers can guide students toward mastering various basic movement skills and implementing strategies in games or sports, making learning more engaging and meaningful. The main stages of physical education learning include the development of locomotor, non-locomotor, and manipulative movement. In addition, learning can also be used to train critical thinking skills and instill positive values such as honesty, responsibility, tolerance, discipline, and emotional management (Syaputra et al., 2023). One alternative for implementing effective physical education learning is through traditional games that have been played for generations since ancient times.

Traditional games are a form of activity that has grown and developed in society since ancient times, from the kingdom era to the acculturation process during the colonial era. Many traditional games are now known only by name, but students are still quite familiar with various types of traditional games in their communities. Therefore, it is hoped that traditional games can continue to be preserved and not be displaced, eroded, or even lost due to the development of modern games (Siswanto et al., 2022). These traditional games, passed down through generations, have many benefits. Besides preserving culture and fostering a sense of national belonging, they also provide enjoyment for the players (Fajar et al., 2025). On the other hand, this activity is beneficial for psychological development, increasing creativity, agility and motivation, and can be used as a means of exercise to improve physical fitness (Rachman et al., 2023). In addition to providing benefits in preserving culture and improving physical fitness, modified traditional games also have educational value that can support students' overall development. From a cognitive perspective, students are trained to understand game rules, develop strategies, and make decisions during the game. From an affective perspective, traditional games can instill attitudes of cooperation, sportsmanship, responsibility, discipline, and the ability to control emotions when interacting with peers. Meanwhile, from a psychomotor

perspective, students can develop basic motor skills such as running, dodging, throwing, catching, and blocking, which are actively performed throughout the game. Thus, modified traditional games function not only as a medium of entertainment but also as an educational tool that can support the optimal development of students' skills and character (Kiryasyah et al., 2026).

One of the traditional games frequently played and even competed in festivals like the National Sports Week (O2SN) at the elementary school level is gobak sodor or hadang. Gobak sodor is a team game involving two teams. One team acts as the attackers, tasked with crossing the defense line, while the other team acts as the defenders, blocking and guarding the defense lines. In addition, one member of the guard team is in the middle defense line or what is known as the sodor line (Febriansyah et al., 2024). However, when applied to physical education lessons, traditional games are often modified to suit the conditions and situations in the school environment. These modifications are made to make the games more engaging, easier to play, and safe for students. The goal is to prevent students from quickly becoming bored or tired during the lesson. Qonita F.R et al., (2024) explained that in modifying physical education learning, it is necessary to pay attention to several conditions, namely that it is safe to use, able to encourage children to be active, has affordable costs, is appropriate to the needs of students, and is adapted to the environment and the school's ability to implement the modification.

Invasion games are a learning method in Physical Education and Health. Invasion games attract students because of their competitive and fun nature, which tends to motivate them to develop skills and actively participate. However, the success of invasion game learning depends largely on proper design and implementation. According to Saputra et al., (2024), invasion games can be combined with handball games.

Based on the results of field observations during PPL (School Field Introduction) and interviews at SDN Pakintelan 02 located on Jl. Krajan Raya, Pakintelan, Gunungpati District, Semarang City, Central Java, researchers observed that physical education learning in schools still tends to involve less active interaction so that it has not been able to attract children's interest in learning optimally. Based on the results of observations during the physical education learning process, of a total of 28 fifth grade students, there were around 17 students (60.7%) who appeared less active in participating in learning activities. This was indicated by low student participation during the game, such as a lack of involvement in teamwork, minimal active movement, and low enthusiasm when the teacher gave game instructions. In addition, the use of sports facilities at the school was also still limited and less varied so that learning more often used simple equipment without any interesting game innovations. Researchers also conducted interviews at the school by asking several questions to the physical education teacher about the traditional games of gobak sodor or hadang and handball. The results, the teacher said that the game of gobak sodor was very rarely played by students and was only implemented around 1-2 times a semester. This is due to limited facilities and infrastructure, low student interest in traditional games, and game rules that are not fully understood by elementary school students. Based on this description, the researcher got the idea to develop a modification that collaborates handball with the traditional game of gobak sodor or hadang. This idea arose because both games have similar techniques, namely blocking techniques. Through the development of this collaborative modified game, it is hoped that students will be able to perform and master various movement activities contained in the game. In addition, students are also expected to understand that handball can be combined with the traditional game of gobak sodor or hadang and applied in physical education learning on the topic of large balls.

METHODS

This research is a type of development research. Development research is a type of research that aims to develop and produce a product (Waruwu, 2024). The product of this research is a handball game model called Gobak Sodor (GOTANG) as an alternative model for physical education learning in elementary schools. The media development design in this research is adapted from the ADDIE development model. The ADDIE model was chosen in this study because it has a systematic, flexible, and structured framework that is suitable for developing learning products in physical education. Compared to other development models such as Borg & Gall or Dick and Carey, ADDIE is considered simpler and easier to implement in elementary school learning contexts because each stage can be evaluated continuously before proceeding to the next stage. In the GOTANG game development, the analysis stage was carried out through observation and interviews with physical education teachers to identify learning problems and student needs. The design stage focused on designing game rules, equipment dimensions, and learning activities adapted to fifth-grade students. The development stage involved producing the GOTANG prototype and validating it with game and physical education experts. The implementation stage was conducted through small-group and large-group trials in elementary schools. Finally, the evaluation stage was conducted by analyzing expert suggestions, trial results, and student responses to improve the feasibility and effectiveness of the GOTANG game model. The steps of development research can be explained through a diagram like the one below:

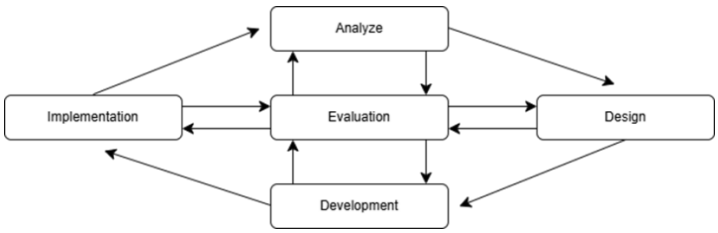

Figure 1. Development Procedures
Source: (Arifin et al., 2018)

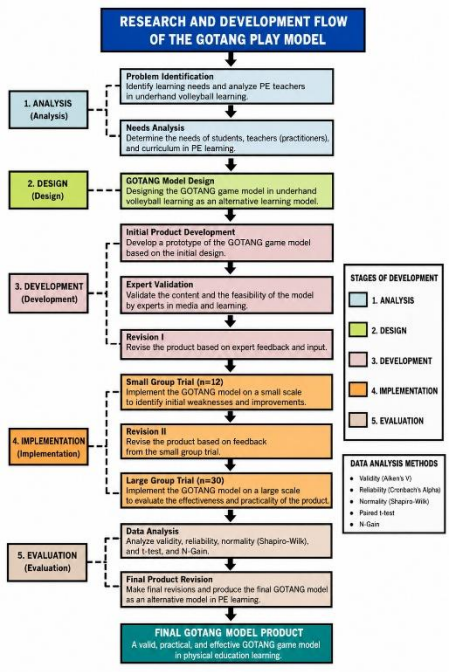

Figure 2. Flowchart diagram
Source: Author

The steps outlined above are the ADDIE model steps implemented by the researcher to carry out the research phase. In this development, the researcher conducted initial stages, namely observation to identify problems, developing product designs, manufacturing initial products, field trials, and evaluations to identify obstacles and potential of the Gobak Sodor Handball (GOTANG) game model based on field trials and expert assessments.

Figure 3. GOTANG game model

Learning modification is a form of creativity that can be done to modify variations in game material models by applying various learning techniques and models. Handball Gobak Sodor (GOTANG) can be installed by arranging light materials, and the distance can also be adjusted to suit student needs. In this development research, the final product was determined based on the results of data analysis obtained during the validation process and field trials involving the target group (Triasaputra, 2025).

The data obtained in this study comprises both qualitative and quantitative data. Qualitative data were obtained from questionnaires containing criticism and suggestions from physical education experts/teachers and game experts as input for improving the product under study. Quantitative data were obtained from questionnaires administered to experts and students.

The research instrument used in this study was a questionnaire consisting of 45 items covering cognitive, affective, and psychomotor aspects related to the implementation of the GOTANG game model. The cognitive aspect measured students' understanding of game rules, strategies, and learning concepts. The affective aspect measured cooperation, discipline, responsibility, and sportsmanship during the game. Meanwhile, the psychomotor aspect measured students' movement skills such as throwing, catching, running, blocking, and coordination during gameplay. The questionnaire used a dichotomous Guttman scale with two answer choices, namely "Yes" and "No". After validity testing, 10 valid items were retained and used for reliability testing and data collection.

The data analysis technique in the quantitative phase of this study uses descriptive analysis in the form of percentages. In this study, the percentage formula is used Asyhari dkk (dalam Arifah, Sukirman, and Sujalwo 2019) with the formula:

$$P = \frac{f}{N} X\ 100\%$$

Information:
P = The percentage score sought
f = Score obtained by the validator
N = Maximum score
From the results, the percentages obtained are then classified to obtain data conclusions.

Table 1. Percentage Percentage Classification

Presentation	Classification	Meaning
76-100%	Good	Very Usable
51-75%	Sufficient	Usable
26-50%	Not Good	Repairable
0-25%	Not Good	Not Usable

Source: Sugiono (in Arif Rachman, Yochanan 2024)

RESULTS AND DISCUSSION

This research was conducted at SDN Pakintelan 2 and SDN Pakintelan 3 Semarang. The results of the product development were in the form of a handball game model (GOTANG) for active student participation in physical education learning for grade V. The description of this media is as follows: Physical Form: 1) PVC material, 2) Rattan hoop as a target, and 3) Target size 45 cm in diameter. On the PVC paralon section there are dimensions, namely length and width of 150 cm.

This media product has been configured to be disassembled and assembled. The research findings are expected to not only provide solutions to the problems at Pakintelan Elementary School but also serve as a reference for other elementary schools in developing effective game models tailored to the needs of basic engineering learning. In line with Adank et al., (2024) opinion, Learning media designed with attention to motivational aspects can increase the enjoyment, focus, and interest of players during the learning process, especially in early childhood who easily get bored while learning (He, X., & Wei, L., 2025). The development guide for the "GOTANG" handball game model for active student participation in physical education learning for grade V can be accessed via the link: https://bit.ly/Produkpermainangotang

The game and physical education experts who were validators in this study were Mr. Fery Darmanto, S.Pd., M.Pd. as a game expert and the physical education teacher of SDN Pakintelan 2, Mr. Maulana Sjarief, S. Pd. and the physical education teacher of SDN Pakintelan 3, Mrs. Kusmiyati, S. Pd. as physical education experts. Based on the suitability with the competency standards, safety, usefulness and suitability of use, the experts stated that the handball gobak sodor (GOTANG) game model for active student participation in physical education learning for grade V was worthy of being tested. The percentage obtained is 97% and received a "Good" rating. The following table shows the expert validator's results:

Table 2. Expert Validator Result

Rated Aspect	1st Validator	2nd Validator	3rd Validator	Score is Obtained	Maximum score	%
Compliance with competency standards (Wibowo & Nanda, 2022)	11	11	12	34	36	94%
Security (Putri et al., 2025)	11	12	11	34	36	94%
Expediency (Fauzi & Pelana, 2025)	12	12	11	35	36	97%
Feasibility of use (Wiguno, 2025)	12	12	12	36	36	100%
Total Value	46	47	46	139	144	97%
Mean	11,5	11,7	11,5	34,7	36	97%

Statistical analysis in this study was conducted through several stages. First, a validity test was conducted on 45 questionnaire items measuring cognitive, affective, and psychomotor aspects related to the implementation of the GOTANG game model. The validity test results showed that 10 items were declared valid and suitable for further analysis, while the remaining items were revised. After the validity test, a reliability test was conducted using the Kuder-

Richardson 20 (KR-20) formula to determine the internal consistency of the instrument. The reliability coefficient obtained was 0.903, indicating that the instrument had very high reliability and was suitable for use in data collection. Furthermore, the Shapiro-Wilk normality test was used to determine whether the pretest and posttest data were normally distributed. If the data met the normality assumption, the paired sample t-test was used to analyze differences between pretest and posttest scores in cognitive, affective, and psychomotor aspects. In addition, the N-Gain test was used to determine the effectiveness level of the GOTANG game model in improving student participation and learning outcomes. The results of the validity, reliability, normality, paired sample t-test, and N-Gain analyses were used as the basis for evaluating the feasibility and effectiveness of the developed product.

A validity test of 45 items measuring students' knowledge, attitudes, and skills regarding the GOTANG game model was conducted. The validity test results showed that 10 items (22%) were valid, while 35 (78%) were invalid. Therefore, the invalid items needed to be revised by clarifying the focus of the questions and linking them directly to the implementation of the GOTANG learning model.

Percentage of valid items:

$$P = \frac{10}{45} \times 100\%$$

$$P = 0{,}22 \times 100$$

$$P = 22\%$$

Percentage of invalid items:

$$P = \frac{35}{45} \times 100\%$$

$$P = 0{,}77 \times 100$$

$$P = 78\%$$

After conducting a validity test and obtaining items that meet the criteria, the next step is to conduct a reliability test to determine the level of internal consistency of the instrument. The reliability test in this study uses the Kuder-Richardson 20 (KR-20) formula and is only conducted on items that are declared valid in all aspects.

Across all aspects, 10 of the 45 items tested met the validity criteria. The reliability calculation for these 10 items showed a KR-20 coefficient of 0.903. This value is in the very high category (r_{11} > 0.70), thus the instrument is considered reliable and has excellent internal consistency. This indicates that each item in the instrument is able to provide consistent measurement results in measuring cognitive, affective, and psychomotor aspects. Therefore, the instrument is suitable for use as a data collection tool in research because it has a high level of consistency in measuring the variables studied.

A good or acceptable reliability coefficient value is generally above 0.70. For instruments with dichotomous data, such as scores of 1 and 0, reliability testing can use the Kuder-Richardson 20 (KR-20) formula, which has a similar function to Cronbach's Alpha in measuring the internal consistency of an instrument. A reliability value above 0.70 indicates that the instrument has a good level of consistency and is trustworthy, while a value below this limit indicates the need for revision or improvement of the instrument items. Several studies have stated that a reliability coefficient between 0.70 and 0.80 is considered good, while a value above 0.80 indicates high or excellent reliability (Setyaedhi, 2024).

Based on the calculations for this research instrument, the KR-20 reliability coefficient was 0.903. This value is above the minimum threshold of 0.70, making it categorized as very high reliability. Therefore, the research instrument is deemed to have excellent internal consistency and is suitable for use as a data collection tool.

Overall, the reliability test results indicate that all instrument items are capable of providing consistent measurement results across cognitive, affective, and psychomotor aspects.

Therefore, this instrument can be used to support the accuracy of research data in measuring the variables studied and ensure that the data obtained has a high level of reliability.

Small Group Product Trials

The normality test was conducted using the Shapiro-Wilk test because the sample size was less than 50 respondents (n = 15). This test aims to determine whether the pretest and posttest data for each aspect are normally distributed. The use of the Shapiro-Wilk test for small samples is supported by research in the journal Mathematics, which states that the Shapiro-Wilk test has a better level of statistical power than other normality tests for small sample sizes (Mishra et al., 2019).

Table 3. Normality Test Result

Cognitive aspect data	N	Shapiro Wilk statistics	Sig.	Information
Pretest	15	0,839	0,058	Normal
Posstest	15	0,817	0,063	Normal

Affective aspect data	N	Shapiro Wilk statistics	Sig.	Information
Pretest	15	0,817	0,062	Normal
Posstest	15	0,783	0,069	Normal

Psychomotor aspect data	N	Shapiro Wilk statistics	Sig.	Information
Pretest	15	0,908	0,126	Normal
Posstest	15	0,783	0,130	Normal

Based on the results of the normality test using Shapiro-Wilk on the cognitive, affective, and psychomotor aspects, the significance value (Sig.) obtained for all pretest and posttest data was greater than 0.05. In the cognitive aspect, the significance value for the pretest was 0.058 and the posttest was 0.063. In the affective aspect, the significance value for the pretest was 0.062 and the posttest was 0.069. Meanwhile, in the psychomotor aspect, the significance value for the pretest was 0.126 and the posttest was 0.130. Because all significance values were greater than 0.05, the pretest and posttest data in all three aspects were declared normally distributed. Thus, data analysis can be continued using a parametric test, namely the paired t-test (Paired Sample t-test).

A paired t-test was conducted to determine whether there was a significant difference between the pretest and posttest scores after using the GOTANG game media.

Table 4. Result Uji t

Aspect	t count	Sig. (2-tailed)	Information
Cognitive	-6,004	< 0,001	Significant
Affective	-8,576	< 0,001	Significant
Psychomotor	-6,971	< 0,001	Significant

Based on the t-test results, all aspects showed a significance value <0.001 (<0.05). This means there is a significant difference between the pretest and posttest scores in the cognitive (t = -6.004), affective (t = -8.576), and psychomotor (t = -6.971) aspects. Thus, the implementation of the GOTANG game model has a significant influence on improving student abilities in small groups (N = 15).

The N-Gain test was conducted to determine the level of active student participation after treatment. The N-Gain formula is:

$$N - Gain = \frac{Posttest - Pretest}{Skor\ Maksimal - Pretest}$$

N-Gain interpretation criteria:

- g ≥ 0,70 → High

- 0,30 ≤ g < 0,70 → Medium
- g < 0,30 → Low

Table 5. Calculation Result N-Gain

Aspect	N	Minimum	Maximum	Mean	Std. Deviation
Cognitive	15	0,33	1,00	0,7224	0,27198
Affective	15	0,33	1,00	0,7229	0,27892
Psychomotor	15	0,33	1,00	0,7333	0,27314

Based on the results of the N-Gain calculation, all aspects are in the high category (Mean>0.7). This indicates that the implementation of the GOTANG game model provides effective improvements to students' abilities, both in terms of knowledge (cognitive: 0.7224), attitudes (affective: 0.7229), and skills (psychomotor: 0.7333).

The greatest improvement was seen in the psychomotor aspect, indicating that the GOTANG game product was very helpful in improving practical skills. Thus, based on the N-Gain results on 15 subjects, the GOTANG game product was declared effective for use in small groups (n = 15).

The results of the small group trial questionnaire regarding the development of the "GOTANG" handball game model for students' active participation in physical education learning showed that for the assessment of the cognitive aspect, 89% were categorized as "Good", the affective aspect was 89% categorized as "Good", and for the psychomotor aspect, 97% were categorized as "Good". The total assessment of the "GOTANG" handball game model according to student respondents was 92% categorized as "Good" which can be interpreted that the product is worthy of being tested to the next stage. The following is a table of small group trials:

Table 6. Small Group Trials

Sample	Rated Aspect			Score is Obtained	Maximum Score	%	Category
	Cognitive	Affective	Psycomo-tor				
Total Value	67	67	73	207	225	92%	Good
Mean	8,9	8,9	9,7	27,5	30	92%	Good
Presentation	89%	89%	97%	92%			

Large Group Product Trials

The Shapiro-Wilk test was used to test for normality because the sample size was less than 50 respondents. This test is recommended for small to medium-sized samples because it has a higher level of statistical power in detecting deviations from the normal distribution.

Table 7. Normality Test Result

Data	N	Shapiro Wilk statistics	Sig.	Information
Pretest	45	0,793	0,130	Normal
Posstest	45	0,697	0,145	Normal

Data	N	Shapiro Wilk statistics	Sig.	Information
Pretest	45	0,716	0,131	Normal
Posstest	45	0,709	0,142	Normal

Data	N	Shapiro Wilk statistics	Sig.	Information
Pretest	45	0,875	0,129	Normal
Posstest	45	0,780	0,140	Normal

Based on the results of the normality test using Shapiro-Wilk in the three aspects of the study, all significance values (Sig.) were greater than 0.05. In the first aspect, the pretest significance value was 0.130 and the posttest significance value was 0.145. In the second aspect, the pretest significance value was 0.131 and the posttest significance value was 0.142. Meanwhile, in the third aspect, the pretest significance value was 0.129 and the posttest significance value was 0.140. Because all significance values were greater than 0.05, the pretest and posttest data in the three aspects were declared normally distributed. Thus, the normality assumption was met and the analysis could be continued using a parametric test, namely the Paired Sample t-Test.

A paired t-test was conducted to determine whether there was a significant difference between the pretest and posttest scores after using the GOTANG game media.

Table 8. Result Uji t

Aspect	t count	Sig. (2-tailed)	Information
Cognitive	-14,702	< 0,001	Significant
Affective	-32,522	< 0,001	Significant
Psychomotor	-11,681	< 0,001	Significant

The significance value for all aspects was <0.001 (<0.05). This indicates that there is a significant difference between the values before and after using the GOTANG game model product in a large group (N=45), with details: cognitive (t = -14.702), affective (t = -32.522), and psychomotor (t = -11.681) aspects.

Thus, the GOTANG product has a significant influence on improving cognitive, affective, and psychomotor aspects in a large group (N=45).

The N-Gain test was conducted to determine the level of improvement in learning outcomes after treatment.

Table 9. Calculation Result N-Gain

Aspect	N	Minimum	Maximum	Mean	Std. Deviation
Cognitive	45	0,00	1,00	0,7870	0,29067
Affective	45	0,33	1,00	0,7186	0,31205
Psychomotor	45	0,33	1,00	0,7130	0,27384

The results showed that all aspects were in the high category (>0.70). This indicates that the GOTANG game product has strong effectiveness in increasing active student participation in large groups (N=45).

Based on the results of the Shapiro-Wilk test, all significance values (Sig.) were greater than 0.05. This indicates that the pretest and posttest data for all three aspects were normally distributed. Thus, the assumption of normality was met, and the analysis could be continued using a parametric test, namely the Paired Sample t-Test.

The results of the Shapiro-Wilk normality test showed that the data were normally distributed, thus meeting the assumptions of the parametric test. A paired t-test showed significant differences between the pretest and posttest in all aspects. Furthermore, the high N-Gain value indicates that the GOTANG game product is effective when applied to larger groups.

The effectiveness of the GOTANG game model can also be explained through the concept of game-based learning, which emphasizes active participation, experiential learning, and student engagement during the learning process. Through direct interaction and movement exploration, students construct their own understanding and skills, which aligns with constructivist learning theory. In addition, the movement activities contained in the GOTANG game support children's motor development theory, which states that elementary school

students learn effectively through active physical experiences, coordination activities, and social interaction during play.

Thus, based on the results of the Shapiro-Wilk test, t-test, and N-Gain on a large group (n = 45), the GOTANG game product was declared effective and suitable for use as a game model in physical education learning for elementary school students.

The results of a large group trial questionnaire regarding the development of the "GOTANG" handball game model for students' active participation in physical education learning for grade V elementary school showed that for the assessment of the cognitive aspect, 84% were categorized as "Good", the affective aspect was 91% categorized as "Good", and for the psychomotor aspect, 95% were categorized as "Good". The total assessment of the "GOTANG" handball game model according to student respondents was 90% categorized as "Good". The following is a table of large group trials:

Table 10. Large Group Trials

Sample	Rated Aspect			Score is Obtained	Maximum Score	%	Category
	Cogni-tive	Affective	Psycomo-tor				
Total Value	189	205	215	609	675	90%	Good
Mean	8,4	9,1	9,5	27	30	90%	Good
Presentation	84%	91%	95%				

A score of 92% in the small group trial and 90% in the large group trial indicates that students demonstrated a high level of acceptance and active participation during the implementation of the GOTANG game model. These results reflect that the learning activities successfully increased student enthusiasm, involvement in teamwork, understanding of game strategies, and mastery of motor skills. High psychomotor scores also indicate that students were able to perform motor activities with more confidence and activeness during the learning process.

The findings of this study are consistent with previous studies on traditional game-based learning in elementary schools. Siswanto et al., (2022) explained that traditional games can improve students' motor development and active participation in physical activities. Similarly, Saputra et al., (2024) found that invasion games in physical education increase student engagement and teamwork skills. However, the novelty of this study lies in combining handball learning with the traditional gobak sodor game through a modified GOTANG model specifically designed for elementary school students. Unlike previous studies that focused only on traditional games or invasion games separately, this study integrates both approaches into one collaborative learning model.

The significant improvement shown in the cognitive, affective, and psychomotor aspects indicates that the GOTANG game model not only improves learning outcomes but also provides important pedagogical impacts in physical education learning. Through collaborative and movement-based activities, students become more active in practicing locomotor and manipulative skills such as running, throwing, catching, and blocking. In addition, the game encourages social interaction, teamwork, discipline, responsibility, and sportsmanship among students. The enjoyable game atmosphere also increases students' learning motivation and participation compared to conventional physical education methods that tend to rely on repetitive drill activities.

Compared with the small group (N=15), the improvement in the large group (N=45) showed a higher mean N-Gain value in the cognitive (0.7870>0.7224) and psychomotor (0.7130 vs 0.7333) aspects as well as consistency in the affective aspect. This indicates that the game model is increasingly stable and consistent in its application.

The GOTANG game model was implemented during physical education learning activities for fifth-grade elementary school students. Each learning session lasted a maximum of 10 minutes per round. The intervention was carried out over four meetings consisting of an

introduction session, game practice, implementation, and evaluation. Students were divided into groups of 4-5 students per team to facilitate active participation during the game. Learning activities were conducted on the school field using modified handball and gobak sodor equipment adapted to student characteristics and school facilities.

Despite the positive results, several limitations were identified during the implementation of the GOTANG game model. First, the PVC frame used in the game still requires additional support such as pegs or weights to improve stability during active movement activities. Second, the game rules and movement intensity may still require simplification when applied to lower elementary grades because younger students have different levels of motor development and understanding. Third, the study involved a limited sample from only two elementary schools, which may affect the generalizability of the findings. Therefore, future studies are recommended to involve larger and more diverse participant groups and to further refine the game equipment and learning procedures.

CONCLUSION

The development of the "GOTANG" handball game model using the ADDIE approach demonstrated that the product is feasible and effective for supporting active participation in elementary school physical education learning. The implementation results showed that the game model was able to create a more engaging and interactive learning atmosphere by encouraging students to actively participate in movement activities, teamwork, and game strategies adapted to their developmental characteristics. In addition to improving basic motor skills such as running, throwing, catching, and blocking, the GOTANG model also contributed to the development of students' social attitudes, discipline, responsibility, and learning motivation through enjoyable game-based activities. The use of modified equipment further supports the practicality of the product because it is relatively affordable and adaptable to school conditions. However, several limitations were identified during implementation, including the need to improve frame stability, simplify game rules for lower-grade students, and expand the research sample to obtain broader findings. Therefore, further refinement and wider implementation are recommended so that the GOTANG game model can be more optimally applied in various elementary school physical education settings.

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