

**Development of the Bentbol Game toward Physical Education Learning at Elementary School**Rizki Praditya Pangestu^{1*}, Agus Pujiyanto²¹²Faculty of Sports Sciences, Universitas Negeri Semarang, Semarang, Indonesia**Keywords**

bentbol games;
physical education;
learning models;
Primary School

Abstract

Physical education learning in elementary schools tends to be monotonous, less engaging, and limited by inadequate facilities, which affects students' interest and participation. This study aimed to develop the Bentbol (Ball Fortress) game model as an innovative Physical Education learning alternative suitable for elementary school students. The study used the Research and Development (R&D) method with the ADDIE model, consisting of analysis, design, development, implementation, and evaluation stages. The subjects were fourth-grade students at SD Negeri 1 Rancamaya, SD Negeri 1 Gunung Lurah, and SD Negeri 3 Cilongok. Data were collected through observation, interviews, and questionnaires, then analyzed using descriptive quantitative and qualitative techniques. The results showed that the Bentbol game model achieved an expert validation score of 95% in the very feasible category. Small-scale trials obtained 77.53% in the good category, while large-scale trials reached 90.06% in the very good category. The improvement in these results shows that the Bentbol game model is effective in increasing students' activeness, cooperation, and movement skills. Therefore, the Bentbol game model is feasible and effective as an innovative and enjoyable Physical Education learning alternative in elementary schools.

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INTRODUCTION

Physical education is one of the important parts of learning activities in school. This means that physical education learning is not just a made-up part or just a decoration in the school program, but is an important and meaningful activity to fill time and make students busier. (Melyza & Agus, 2021). Physical education also serves as a forum to improve students' physical abilities through various activities that suit their development (Rahmadani et al., 2025).

Education is a planned and conscious effort to create a fun learning process, so that students can actively develop their potential in acquiring intelligence, personality, and skills needed in the life of society and the state. The educational process is a system consisting of inputs, processes, and outputs (Marani et al., 2024). Therefore, Invasion games are Penjasorkes' educational methods.

Each stage teaches attacking games, such as soccer, basket ball, and handball. In the invasion game, skills such as mastering basic techniques, clearing the ball, teaming up with friends, planning strategies, and trying to score goals or defend can be integrated with handball games. However, handball is still a sport taught in the physical education curriculum, so it is rarely taught in elementary schools (M. H. P. Saputra et al., 2024).

Facilities and infrastructure are indispensable in sports learning. The lack of learning support facilities in schools will hinder the learning process, thus affecting student learning outcomes. (Hendriadi, 2021). With adequate facilities and infrastructure, teachers can not only design learning according to the curriculum used, but can also create a safe and comfortable learning environment for students. Sustainable management of facilities and infrastructure is essential to meet learning needs, especially to create an engaging, safe, comfortable, and curriculum-compliant learning experience.

There is also the interest and enthusiasm of students for learning which is also the main aspect to achieve the success of the penjasa learning process. To increase the interest and enthusiasm of students, learning methods that suit the needs and characteristics of students are needed. Game-based learning is one of the methods that has proven to be effective in increasing student interest and participation. One of the things we can do to increase students' interest and enthusiasm in game-based learning is to modify invasion games and traditional games.

Invasion games are a type of game that aims to attack opponents, create goals, and also involve trying to prevent opponents from scoring. In addition, An invasion game is a type of game that consists of several different basic moves, such as running, balance, agility, and throwing (M. H. P. Saputra et al., 2024). Invasion games not only play a role as a means of developing motor skills, but also function as a learning medium in instilling social values and character of students. Through invasion game activities, students are trained to build teamwork, appreciate each other's roles, take responsibility for the tasks undertaken, manage emotions, and make decisions in dynamic competitive situations.

Traditional games can simply be interpreted as a game that only requires simple equipment that has been done for generations and can be considered as a culture in the people who do it (Damayanti et al., 2023). Traditional games are forms of games and sports activities that arise from certain community habits. In addition, traditional games are often categorized as types of games that have certain characteristics, which reflect the uniqueness of the local cultural traditions. Traditional games are part of the culture of every tribe that has existed since ancient times before the advent of modern games (Handoko & Gumantan, 2021). One of the traditional games that is still held today is the fort game.

Fort games are a type of traditional game that has cultural value and must be maintained. The game is played by a group of people who are divided into two teams. Each group consists of about four to eight players (Hidayat, 2023). The main objective of the fortification game is to attack by touching the pole or pillar that is the fortress of the opposing team, then saying the word "fortress" to signify that the attack is successful (Priani et al., 2024). But now students when they are learning must often experience boredom, so I modified the game of handball and fortification.

Handball is one of the branches of a large ball sport in which players pass the ball by hand to a teammate with the aim of putting the ball into the opponent's goal. This sport is a team game that involves quite strong physical contact, and the focus is on running, jumping, sprinting, hand strength, throwing the ball with your hands, blocking opponents, and pushing the opponent's players (Rofik & Kafrawi, 2022). Handball games require players to be in good physical condition (Yudho et al., 2022). Students tend to be more enthusiastic when learning is presented in the form of games compared to conventional learning methods. However, in the implementation of Physical Education learning, students often experience boredom which can reduce their motivation and participation. Therefore, this study developed a Bentbol game model by combining elements of handball games and traditional fortification games to create a more interesting and enjoyable learning experience.

This research is supported by previous research conducted by Dewi Rosianah entitled "Development of Gobak Sodor Bola Game Model in Handball Learning in Grade V Elementary School Students." The research developed a modified handball game through adjustments to the size of the court, tools, and game rules to improve students' movement activities. Using the Research and Development (R&D) method, the results of the study show that the game model is effectively used in physical education learning with an average cognitive, psychomotor, and affective aspect score of 85.18% in the good category. Furthermore, a research conducted by Muhamad Abdurochim in 2016 entitled "Development of a Handball Game Model for Upper-Class Elementary School Age Children." The research uses the Research and Development (R&D) method to develop a handball game model that is tailored to the characteristics of high-class elementary school students. The results of the study show that the developed model has been declared feasible based on expert validation, is acceptable to students, and is effectively used in physical education learning. In line with Rosianah and Abdurochim's research, this study also developed a game model to improve the quality of Physical Education learning. However, the novelty of this research lies in the development of the Bentbol game model that combines the traditional game of fortification with the concept of an invasion game adapted from handball and specially designed for grade IV elementary school students. This model is also adjusted to the limitations of school facilities and infrastructure so that it is easy to apply by teachers. The results of the study show that the Bentbol game model is stated to be very feasible and effective, as shown by the results of expert validation of 95% and the results of large-scale trials of 90.06%. These findings show that the Bentbol game can be an innovative and fun alternative to Physical Education learning to improve students' participation, cooperation, sportsmanship, and movement skills.

Game modification is one of the alternative methods that can be used to improve the quality of learning in Physical Education, Sports, and Health (PHYSICAL EDUCATION). Through modification, a game can be adapted and recreated into a new variation by adjusting the rules, equipment, and playing area to suit students' characteristics and learning needs. The uniqueness of this study is in creating the Bentbol (Bentengan Bola) game model. This model combines elements of the traditional bentengan game and the invasion game of handball. This study is different from earlier research that mostly looked at changing current sports games. Instead, it creates a new game model that is specifically made for fourth-grade elementary school students. It takes into account the limited facilities available in schools and aims to help improve students' thinking skills, emotions, and physical abilities all at the same time.[1.1][RP1.2] A modified game is a special version of a game whose rules are slightly changed to better suit the player's abilities and needs, their experience, and the available facilities (Batiurat et al., 2023). According to (Fikri et al., 2022) Modified games are special types of games that undergo changes to several rules to better suit the needs and abilities of students. One of the main problems is the lack of facilities and sports facilities owned by schools. This condition requires physical education teachers to be creative in utilizing and optimizing the available facilities. Therefore, it is necessary to make changes in the way of delivering learning materials for big ball games, both in terms of facilities and facilities as well as the rules applied. O'Neill (A. Saputra et al., 2024) Game modification is a way to enrich learning materials by simplifying the content to suit the abilities and nature of elementary school students. The application of game modifications, such as the game Bentbol (Ball

Fortress), is one of the creative and innovative learning strategies to create a learning atmosphere that is interesting, fun, and easy for students to understand. With these modifications, students are invited to be more active and creative in participating in Physical Education, Sports, and Health learning, so that learning goals can be achieved optimally. In addition, students now must also often after coming home from school directly playing cellphones, it can also make students less enthusiastic when participating in penjas learning at school.

Low student participation in learning Physical Education is a challenge faced by schools in various regions (Lestari, 2024). Monotonous teaching methods, limited facilities and equipment, and the increasing use of mobile phones tend to reduce students' interest and enthusiasm in participating in learning activities. To address this problem, the present study develops the Bentbol game model as an innovative, enjoyable, and practical learning alternative to increase students' motivation, active participation, and movement skills in Physical Education learning [2.1][RP2.2]. The development of this game aims to create a game model that can be used as an alternative medium in learning invasion games. In addition, through this development, it is hoped that students can increase their enthusiasm and involvement in the physical education learning process. The game of bentbol (fort bola) is a modified form of game inspired by the combination of handball games and traditional fort games, which are designed as a learning medium for physical education. This game includes team games that involve various movement activities, such as running, dodging, throwing, shooting, and cooperation between players. Bentbol uses the basic elements of the invasion game, namely attacking and defending to earn points, by applying game rules, tools, and court sizes that have been simplified so that they are flexible and can be adjusted to school conditions. The basic techniques used in this game include throwing, catching, and shooting as in the game of handball, which is combined with elements of the traditional game of fortification. In addition, the field, equipment, game form, and rules in bentbol have been modified in accordance with the availability of facilities and infrastructure as well as the characteristics of elementary school students so that they are easy to understand and play.

METHODS

The research used in this study is research and development. Research and Development (R&D) is an organized approach used in academia and industry to create innovations in the form of products, systems, or models that can be applied in real life. In the field of education and social sciences, R&D methods have a very important role as the basis for creating learning tools, media, and educational technology that suit the needs of students and society at large. In this way, it is hoped that various new ideas can be born that provide benefits to individuals and groups in society.

This research uses a research and development method with the ADDIE model which consists of five stages, namely: analysis, design, development, implementation, and evaluation (Firda, 2023). The ADDIE model is a systematic approach designed to produce effective learning products (Scott, 2025). The stages of the ADDIE model that have been adjusted in this study include:

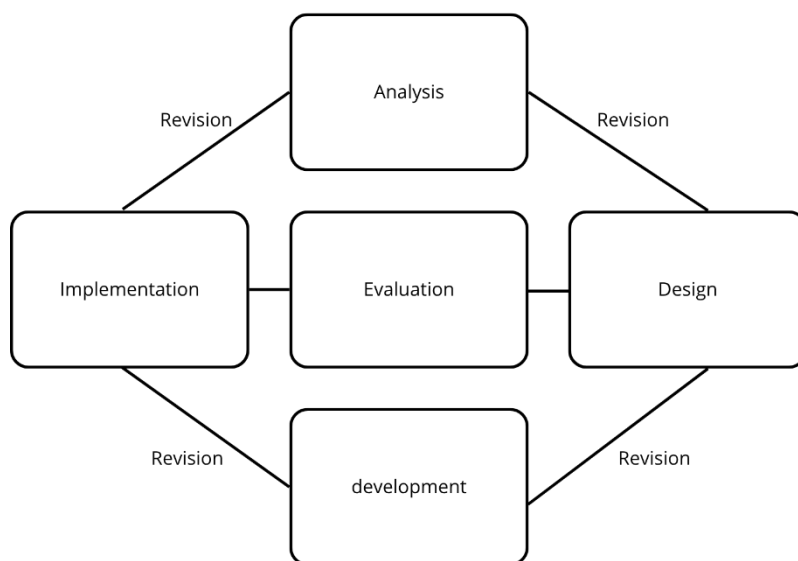


Figure 1. Source branch (2009:2)

1) Analysis

The analysis stage is carried out by observing conditions in the field to identify potentials and problems relevant to the research. The results of initial observations and preliminary studies conducted on February 10-13, 2026 show that the Physical Education learning process still tends to be monotonous and less varied in 3 schools, namely SD Negeri 1 Gunung Lurah, SD Negeri 1 Rancamaya, SD Negeri 3 Cilongok. So that students are less daring to participate and less enthusiastic in following the learning process. In addition, the limited facilities and infrastructure available in schools are obstacles in the implementation of optimal learning. This condition shows the need for an innovative, interesting, and adaptable learning model to the limitations of existing facilities. Therefore, it is necessary to develop a Bentbol game model as an alternative to Physical Education learning that is able to increase students' interest, activeness, and movement skills.

2) Design

The design phase is carried out based on the results of needs analysis. At this stage, researchers develop product designs for bentbol games to increase students' interest, activeness and movement skills. The design includes the determination of rules, fields, tools and safety considerations. The game of bentbol is made so that students are more active when doing Physical Education learning and teachers are easier to teach students to use as invasion game learning. After that, the researcher prepares an assessment instrument for expert validation and product trials.

3) Development

The development phase includes the creation of an initial product in the form of a bentbol game based on a previously developed design. The resulting product then undergoes a validation process by experts to assess how feasible it is before being implemented in the field. Validation is carried out by a Game expert who assesses the physical aspects of the tool, the design, and the level of safety to be used in the learning process of the function, effectiveness and suitability of the game of bentbol with the characteristics of the learning process. In addition, validation is also carried out by a material expert who assesses the function, effectiveness and suitability of the game of bentbol with the characteristics of the learning process. The results of these expert assessments are used as a basis for improving and refining the product.

4) Implementation

After the product is revised based on expert input, the game of bentbol is then tested in the learning process activities. The trial was carried out in Class IV of elementary schools in Cilongok District. At this stage, the game of bentbol is used directly in the learning process to assess the ease of use, safety of the product, and the response of teachers and students to the product.

5) Evaluation

Evaluation is carried out continuously at each stage of ADDIE, with an emphasis on the post-implementation phase of the product. The evaluation process aims to identify the strengths and weaknesses of the game of bentbol based on on-field trials and expert assessments. If there are still challenges, such as safety or comfort levels during use, further revisions of the product will be made. The game of bentbol is considered suitable for use if it meets the criteria of effectiveness, efficiency and safety as an auxiliary medium for learning the invasion game and has the potential for wider production and use.

The subject of this study is a class IV State Elementary School student in Cilongok district. The trial was carried out in a small group of 31 students at SD Negeri Rancamaya and a large group of 26 students at SD Negeri 3 Cilongok and 29 students at SD Negeri 1 Gunung lurah. The data collection instrument used is a questionnaire instrument that includes questions about the safety, convenience and effectiveness of the game of badball.

The score for each question is in the range of 1 to 5 based on the Likert scale. The highest score on the Likert scale applied in this study was five. Here are the scoring criteria for the Likert scale:

Table 1. Score Scoring Guidelines

Score	Remarks
4	Excellent
3	Good
2	Less good
1	Not good

Sample determination using the formula:

$$P = \frac{F}{N} \times 100\%$$

Figure 2. Percentage formula

Description :

P = Percentage of activity score obtained.

F = the activity score obtained based on the descriptor.

N = maximum score.

From the results of the percentages obtained, they are then classified to obtain data conclusions.

Table 2. Percentage classification

Presentase	Klasifikasi	Meaning
81-100%	Excellent	Highly Usable
61-80%	Good	Usable
41-60%	Enough	Fixed
21-40%	Not Good	Less usable
0-20%	Not Good	Unusable

RESULTS AND DISCUSSION

Based on the evaluation of all the information obtained in the field, the author collects the data, so that the average overall assessment results can be explained as follows:

Table 3. Validity expert results analysis

Yes	Types of members	Score obtained (F)	Maximum score (N)	Percentage (%)	Category
1	Gamers	37	40	92,5%	Highly feasible
2	Material Expert	39	40	97,5%	Highly feasible
	Average	76	80	95%	Highly feasible

From the data analysis of the validity results of experts in table 3, the BENTBOL game model obtained an average percentage of 95% which is included in the very feasible category. This evaluation includes the extent to which the model is in accordance with the characteristics of the students, the clarity of the rules of the game, safety aspects, and its effectiveness in improving cognitive, affective, and psychomotor skills. Thus, the results of the development of this game model are very adequate to be applied in the learning process. This high level of validation shows that the game model has met the specified criteria and can be applied effectively in Phase B grade IV at SD Negeri 3 Cilongok, SD Negeri 1 Rancamaya, and SD Negeri 1 Gunung Lurah.

After the data from the respondents' questionnaire is collected, the next step is to analyze the data. This questionnaire was distributed to students to find out their opinions on the game model that has been developed. The following is a recap of the results of small-scale questionnaires from students.

Table 4. Analysis of small-scale learner questionnaires

Yes	School	Number of students	Score Yes (F)	Total score (N)	Percentage (%)	Category
1	SD Negeri 1 Rancamaya	31	283	365	77,53%	Good

Based on the results of the tests that have been carried out, the BENTBOL game model shows an improvement in quality when tested from small to large scale. In a small-scale experiment conducted at SD Negeri 1 Rancamaya, a percentage of 77.53% was obtained with a good category. This shows that this game model can be applied in the learning process, although there are still some shortcomings in its implementation.

Some of the problems found at the small-scale stage include the field that has not met the needs of the game and the use of plastic balls that do not support the smooth running of the game. Plastic balls are considered less effective because they do not provide maximum reflection and control for students. Therefore, at the repair stage, adjustments were made to the field to better suit the character of the game, as well as replacing the ball media with a size 2 handball that is more standard and can improve students' movement skills.

Table 5. Large-scale student questionnaire analysis

School	Number of students	Score Or (F)	Total score (N)	Percentage (%)	Category
State Elementary School 1 Gunung Lurah	29	375	435	86,21 %	Excellent
SD Negeri 3 Cilongok	26	368	390	94,36 %	Excellent
55	743	825	90,06%	Excellent	

**Figure 2.** Bentbol game in elementary school in Cilongok District

After the improvements were made following the results of small-scale experiments, the game model was tested on a larger scale in two schools, namely SD Negeri 1 Gunung Lurah and SD Negeri 3 Cilongok. The results obtained showed a significant increase, with the percentage reaching 86.21% at SD Negeri 1 Gunung Lurah and 94.36% at SD Negeri 3 Cilongok, both of which were included in the very good category. The average percentage on a large scale reached 90.06%, which shows that the BENTBOL game model is getting more effective after improvements are made. If the scale is small and large on Average, it will be: 86.22% (Excellent).

The results indicated an increase from a small trial of 77.53% in the good category to 90.06% in a large trial with a very good category. This increase of 12.53% proves that improvements made to facility elements, especially court adjustments and the use of size 2 handballs, have a positive effect on the effectiveness of the BENTBOL game model.

This improvement shows that improvements in terms of facilities, especially the adjustment of the pitch and the use of the ball in accordance with standards, have a positive effect on the quality of learning. In addition, BENTBOL games have been proven to increase student participation, cooperation, and sports spirit, which can be seen from the many positive responses to attitude and involvement indicators.

However, while results on a large scale show the category is excellent, there are some challenges in basic engineering skills such as throwing, catching, and shooting the ball. This suggests that students still need more intensive and sustained exercise in order for their motor skills to develop properly.

Overall, the improvement in results from small to large scale shows that the BENTBOL game model is effective and feasible to use as an alternative in physical education learning in primary schools. This model not only increases student engagement, but also helps the development of cognitive, affective, and psychomotor aspects holistically, especially after improvements are made to learning media and facilities.

CONCLUSION

Based on the results of the research and development that has been carried out, it can be concluded that the BENTBOL game model is feasible and effective in Physical Education learning in elementary schools. This is evidenced by the validation results of game experts and material experts who obtained an average percentage of 95% with a very decent category. The results of the trial for students also showed an increase from small to large scale. In the small-scale trial, the percentage was obtained of 77.53% with the good category, while in the large-scale trial it increased to 90.06% with the very good category. This increase of 12.53% shows that the improvements made, especially in the adjustment of the field and the use of size 2 handballs, have succeeded in increasing the effectiveness of the learning model. The results of this study are in line with research conducted by Dewi Rosianah which shows that the development of the Gobak Sodor Bola game is effective in improving the cognitive, affective, and psychomotor aspects of students with an average of 85.18% in the good category. In addition, research conducted by Muhamad Abdurochim also shows that the handball game model that is adjusted to the characteristics of elementary school students is declared feasible based on expert validation, can be accepted by students, and is effectively used in physical education learning. Thus, the results of this study reinforce the findings of previous research that game modifications adapted to the characteristics of students can improve the quality of Physical Education learning. The BENTBOL game model can be used as an innovative and fun learning alternative to increase participation, cooperation, sportsmanship, and support the development of cognitive, affective, and psychomotor aspects of students in elementary school.

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