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Development of a Fun Games-Based Cricket Training Model to Enhance Basic Bowling Techniques for 9-12 Year-Old Primary School Students

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Abstract: Cricket is a sport that has only recently been introduced at the elementary school level. In developing young athletes, it is essential to design a training model that is both enjoyable and effective to enhance basic technical skills, particularly the bowling technique in cricket. This study aims to identify, assess the feasibility, and determine the effectiveness of a fun games-based cricket activity training model for improving basic bowling techniques among elementary school students aged 9–12 years. The research employed the ADDIE development model involving 30 participants aged 9–12 years, categorized in the "learn to train" stage. The results showed that the fun games-based cricket training model effectively improved basic bowling techniques, as indicated by a t-value of -76.879 and a p-value of 0.000 < 0.05. The model was also found to be practical, with average scores in each test falling within the "practical" category. Furthermore, the pretest–posttest results demonstrated the model's effectiveness with a p-value of 0.000 < 0.05. In addition, the model outperformed conventional training methods, as evidenced by a higher N-Gain in the experimental group (58.14%) compared to the control group (30.34%). These findings suggest that a fun games-based cricket training model can serve as an effective and engaging approach to developing basic bowling skills among children aged 9–12 years.

Keywords: Cricket Activity Training Model, Fun Games, Bowling, Kids

1. Introduction

Sports play a crucial role in character building, physical health, and the development of children's motor skills. In the field of education, sports do not only serve as a means of promoting physical fitness without excessive fatigue, but also as an important tool for overall personal development [1][2][3][4][5], but also as a medium for instilling social values such as teamwork, sportsmanship, and discipline [6][7][8][9]. The age range of 9–12 years is known as the golden age [10][11], This is the period when children have an excellent ability to learn movement skills [12][13]. Therefore, during this period, children need to be provided with learning and training that is engaging, enjoyable, and aligned with their developmental characteristics so that their physical potential and skills can develop optimally. In achievement-based training and Physical Education, Sports, and Health (PJOK) learning, there is a connection, as the stages within the Long-Term Athlete Development (LTAD) model align with an educational path that corresponds to the LTAD approach. The ideal stages for performance development in LTAD include seven stages: Active Start, FUNdamentals, Learn to Train, Train to Train, Train to Win, Train to Compete, and

Active for Life [14]. The Learn to Train stage is a crucial phase as the foundation that must be prepared by parents, physical education teachers, and coaches as a recommendation before moving on to the specialization stage. In the multilateral stage, or Learn to Train [14] Children will be provided with a training program, undergo the training process, and practice specific movements according to the sport that has been chosen [15], [16].

One of the sports that is rapidly growing in Indonesia is cricket. This sport requires a combination of technical skills, tactics, and good coordination [17][18][19]. In cricket, there are four main fundamental techniques that players must master: batting, bowling, catching, and throwing [20][21][22] . Among these four techniques, bowling plays a very important role as it is the key to creating opportunities to dismiss the opponent and determine the flow of the game. A player with good bowling skills will be able to control the direction, speed, and variation of the ball delivery, which can ultimately provide a strategic advantage for their team [23][24][25] therefore, training that is monotonous or overly technical often makes children quickly lose interest and motivation [26]. Therefore, a more engaging and enjoyable training approach is needed, one of which is the play-based training model. This approach places the child at the center of the learning process by integrating elements of play into skill training. As a result, children can learn bowling techniques naturally while still enjoying the activity of sports.

The play-based training model can be applied in various forms of games that are modified according to the training objectives [26][27][28] [29]. For example, target bowling games, relay bowling, or zone bowling, where children are encouraged to practice the bowling technique through simple competitive activities involving targets, distances, and adjusted rules. Through this model, children not only practice the correct technique for throwing the ball, but also develop concentration, accuracy, and movement coordination [30][31]. In addition, the element of play makes the training more dynamic and fosters enthusiasm as well as active participation from each participant. Several previous studies have shown that the play-based training model can enhance the effectiveness of motor skill learning because it creates a fun and pressure-free learning environment [32][33]. In the context of cricket, play-based training can help children understand the concept of bowling in a contextual manner, not just as a mechanical movement, but also how the technique is applied in real-game situations. In other words, children learn through meaningful play experiences.

However, there are variations in the implementation of play-based training models. Some models place more emphasis on accuracy and movement control, while others focus more on speed and coordination. Therefore, it is important to compare different play-based training models to determine which one is most effective in improving the bowling skills of children aged 9–12 years. This study is expected to make a scientific contribution to the development of cricket training methods that align with the characteristics of early childhood, as well as enrich the literature in the field of physical education and sports. Overall, this research aims to analyze and compare the effects of various play-based training models on improving cricket bowling technique skills in children aged 9–12 years. The results of the study are expected to serve as a reference for coaches, physical education teachers, and cricket development organizations in designing effective, enjoyable, and skill-development-oriented training programs from an early age.

2. Materials and methods

Research Design

This study employed a Research and Development (R&D) approach using the ADDIE model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The purpose of this study was to develop and examine the effectiveness of a play-based training model using structured fun games to improve elementary school students' bowling skills.

During the implementation phase, the effectiveness of the developed model was tested using a quasi-experimental one-group pretest–posttest design. Students' bowling skills were measured before and after the intervention to determine the impact of the training model.

Participants and Research Setting

The study involved two stages of field testing: a small-group trial and a large-group trial. The small-group trial was conducted at SD Laboratorium Pembangunan UNP from June to July 2025, while the large-group trial was conducted at SDN 37 Anduring from August to September 2025. The research activities took place at both schools.

Participants were selected using a purposive sampling technique. The selection criteria included students' grade level, active participation in physical education classes, and readiness to perform basic motor skills related to bowling. This technique ensured that the selected participants were representative and relevant to the objectives of the study.

Development of the Fun Games-Based Training Model

The developed training model was designed to improve fundamental bowling techniques, including grip, stance, swing, release, and accuracy. The model adopted play-based learning principles emphasizing enjoyment, active participation, collaboration, progressive challenges, and immediate feedback.

Each training session lasted approximately 80 minutes and was conducted twice per week. The session structure consisted of four phases:

1. **Warm-up (10 minutes):**
   Dynamic movement activities and simple throwing or rolling games related to bowling movements.
2. **Core Activities (40 minutes):**
   Structured fun games designed to develop specific bowling techniques.
3. **Game Application (20 minutes):**
   Small-group competitive activities applying the techniques learned.
4. **Cool-down and Reflection (10 minutes):**
   Stretching exercises and guided discussion to reflect on performance and learning outcomes.

Description of the Fun Games Activities

The fun games were systematically designed to combine technical skill development with engaging game elements. The main activities included:

1. **Target Knockdown Challenge:**
   Students attempted to knock down modified pins using lightweight balls. Points were awarded based on the number of pins knocked down. This activity focused on accuracy and direction control.
2. **Zone Accuracy Game:**
   The bowling lane was divided into scoring zones with different point values. Students aimed to roll the ball into higher-scoring zones, encouraging precision and strategic thinking.
3. **Relay Bowling Race:**
   Students worked in teams to complete bowling tasks in a relay format. This activity promoted teamwork, coordination, and sustained engagement.
4. **Obstacle Bowling Path:**
   Cones or markers were placed along the lane to require students to control ball direction and adjust speed.

These activities were categorized as "fun games" because they incorporated structured competition, scoring systems, progressive challenges, modified child-friendly equipment, collaborative formats, and immediate feedback. The playful format aimed to increase motivation and enjoyment while maintaining clear instructional objectives.

Research Instrument: Bowling Test

The primary instrument used to measure students' bowling skills was a Bowling Test that combined qualitative and quantitative assessments.

The assessment consisted of the following components:

1. **Grip Technique (Qualitative):**
   Evaluated using a 4-point rubric assessing hand placement and ball control.
2. **Stance and Body Position (Qualitative):**
   Assessed using a 4-point rubric based on balance and posture.
3. **Swing and Release Technique (Qualitative):**
   Evaluated using a 4-point rubric measuring arm motion consistency and release timing.
4. **Accuracy (Quantitative):**
   Measured by the number of pins knocked down in three attempts.

The total score was calculated by combining the technique rubric scores and the quantitative performance score.

Validity and Reliability

Content validity of the instrument and training model was established through expert judgment. Three experts in physical education and motor skill development evaluated the relevance, clarity, and suitability of the instrument and activities for elementary school students. Revisions were made based on their recommendations.

Construct validity was examined during the small-group trial through pilot testing and item analysis to ensure that each assessment component measured bowling skill performance appropriately.

Reliability testing was conducted using inter-rater reliability procedures. Two trained evaluators independently assessed students' performance. The Intraclass Correlation Coefficient (ICC) showed a coefficient above 0.80, indicating high agreement between raters. Internal consistency reliability was also calculated using Cronbach's Alpha, yielding a coefficient above 0.70, which indicates acceptable reliability.

Data Analysis

Pretest and posttest scores were analyzed using descriptive statistics and inferential analysis to determine differences in students' bowling skill performance before and after the intervention. The results were used to evaluate the effectiveness of the developed play-based training model.

3. Results

A. Expert Evaluaion

The expert evaluation of the play-based training model for cricket activities using fun games to improve basic bowling techniques will be conducted by experts in the field in June 2025. The evaluation will be carried out by experts using a questionnaire. The measurement scale employed will be a Likert scale with an interval range of 1-4. The results of the evaluation regarding the content of the play-based cricket training model for enhancing basic bowling techniques are presented in Table 1 as follows:

Tabel 1. Expert Evaluation Results

Expert Category	Percentage	Category
Language Expert	92.50%	Valid
Content Expert	91.25%	Valid
Media Expert	91.25%	Valid
Teacher	93.75%	Valid

B. Effectiveness Test

Effectiveness test is conducted to evaluate the effectiveness of the play-based training model for cricket activities using fun games to enhance basic bowling techniques. The research design employed in this study is the "Pre-test-Posttest Only Control Group Design." In this design, the researcher administers a pretest at the beginning of the study to obtain baseline data of the participants. A posttest is then given at the conclusion of the study, and the results will be analyzed to draw conclusions from the research.

a) Experimental Group

a. Descriptive Analysis Results

The results of the descriptive analysis of the pretest and posttest data for basic bowling technique skills of the students at SDN 37 Anduring are presented in Table 2 below.

Table 2. Descriptive Analysis Results of Pretest and Posttest in the Experimental Group

Data		Max	Min	SD	Average
Bowling Test	Pretest	15	3	2.85	9.40
	Postest	25	18	2.18	21.13

Based on the analysis results above, it can be observed that the data for basic bowling technique ability, derived from the pretest and posttest scores, shows significant improvement. The statistical results indicate that for the bowling test, the maximum score was 15 for the pretest and 25 for the posttest, the minimum score was 3 for the pretest and 18 for the posttest, the standard deviation (stdev) was 2.85 for the pretest and 2.18 for the posttest, and the average score was 9.40 for the pretest and 21.13 for the posttest.

b. Normality Test

A normality test was conducted to determine whether the variables used in the study follow a normal distribution. The normality test in this study was performed using SPSS version 21, with the Kolmogorov-Smirnov formula. The results presented below are the outcomes of the normality test in this research. For further clarification, the results can be seen in Table 3 below.

Table 3. Kolmogorov-Smirnov Normality Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		30
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.53011579
Most Extreme Differences	Absolute	.096
	Positive	.081
	Negative	-.096
Test Statistic		.096
Asymp. Sig. (2-tailed)		.200[c]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Based on the results of the normality test using the Kolmogorov-Smirnov method, it can be observed that the bowling technique skill data for the students has a value of 0.071. According to the decision rule for the normality test using the Kolmogorov-Smirnov test, if the significance value is greater than 0.05, then the residuals are normally distributed. Conversely, if the significance value is less than 0.05, the data is not normally distributed. Therefore, it can be concluded that the data for each variable in this study follows a normal distribution, as evidenced by the significance value of 0.200, which is greater than 0.05.

c. Homogeneity Test

The homogeneity test was conducted to examine whether the sample variances are equal or uniform, based on the samples taken from the population. The homogeneity test was performed using SPSS version 22 with Levene's test. The results of the homogeneity test using SPSS version 22 are presented in Table 4 below.

Table 2. Levene's Test of Homogeneity

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
1.166	1	58	.285

Based on the results of the homogeneity test using SPSS version 22 with Levene's test, it can be observed that the basic bowling technique skill data for the students has a significance value of 0.285. According to the decision rule for the homogeneity test using Levene's test, if the significance value is greater than 0.05, the residuals are considered homogeneous. Conversely, if the significance value is less than 0.05, the data is considered heterogeneous. Therefore, it can be concluded that the data for each variable in this study is homogeneous, as evidenced by the significance value of 0.285, which is greater than 0.05.

d. Paired Sampel Test

Hypothesis testing was conducted using the paired sample t-test (df = n-1). This analysis was employed to determine the effectiveness of the play-based training model for cricket activities using fun games to improve basic bowling techniques. The research conclusion is considered significant if the t-value is greater than the t-table value and the p-value is less than 0.05. The results of the paired sample t-test analysis are presented in Table 5 below.

Table 3. Paired Sample t-Test Results

Paired Differences					t	df	Sig. (2-tailed)
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
-12.733	.907	.166	-13.072	-12.395	-76.879	29	.000

Based on the results of the paired sample t-test analysis in the table above, it can be explained that the pretest-posttest data for the play-based training model for cricket activities using fun games to improve basic bowling techniques yielded a t-value of -76.879 and a p-value of 0.000, which is less than 0.05. Therefore, the hypothesis stating that "the play-based training model for cricket activities using fun games improves basic bowling techniques" is accepted. After observing the results obtained from the experimental group, a comparison is made with the control group, which serves as the benchmark in this study.

b) Control Group

a. Descriptive Analysis Results

The results of the descriptive analysis of the pretest and posttest data for basic bowling technique skills of the students at the SD Laboratorium Pembangunan UNP are presented in Table 6 below.

Table 4. Descriptive Analysis Results of Pretest and Posttest

Data		Max	Min	SD	Average
Bowling Test	Pretest	16	4	2.91	9.83
	Postest	24	16	3.86	15.92

Based on the analysis results above, it can be seen that the data for basic bowling technique ability, obtained from the pretest and posttest scores, shows the following statistical values. The maximum score for the bowling test was 16 for the pretest and 24 for the posttest. The minimum score was 4 for the pretest and 16 for the posttest. The standard deviation (stdev) was 2.91 for the pretest and 3.86 for the posttest, while the average score was 9.83 for the pretest and 15.92 for the posttest.

b. Normality Test

A normality test was conducted to determine whether the variables used in the study follow a normal distribution. The normality test in this study was performed using SPSS version 21 with the Kolmogorov-Smirnov formula. The results presented below are the outcomes of the normality test in this research. For further clarification, the results are shown in Table 7 below.

Table 5. Kolmogorov-Smirnov Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		24
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1.04821445
Most Extreme Differences	Absolute	.108
	Positive	.108
	Negative	-.071
Test Statistic		.108
Asymp. Sig. (2-tailed)		.200[c,d]
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

Based on the results of the normality test using the Kolmogorov-Smirnov method, it can be observed that the bowling cricket technique skill data for the students has a significance value of 0.200. According to the decision rule for the normality test using the Kolmogorov-Smirnov test, if the significance value is greater than 0.05, the residuals are considered normally distributed. Conversely, if the significance value is less than 0.05, the data is not normally distributed. Therefore, it can be concluded that the data for each variable in this study follows a normal distribution, as evidenced by the significance value of 0.200, which is greater than 0.05.

c. Homogeneity Test

The homogeneity test was conducted to examine whether the sample variances are equal, i.e., whether the sample taken from the population is uniform. The homogeneity test was performed using SPSS version 22 with Levene's test. The results of the homogeneity test using SPSS version 22 are presented in Table 8 below.

Table 6. Levene's Test of Homogeneity of Variances

Test of Homogeneity of Variances			
Levene Statistic	**df1**	**df2**	**Sig.**
1.942	1	46	.170

Based on the results of the homogeneity test using SPSS version 22 with Levene's test, it can be observed that the data for the basic bowling cricket technique skills of the students has a significance value of 0.170. According to the decision rule for the homogeneity test using Levene's test, if the significance value is greater than 0.05, the residuals are considered homogeneous. Conversely, if the significance value is less than 0.05, the data is considered heterogeneous. Therefore, it can be concluded that the data for each variable in this study is homogeneous, as evidenced by the significance value of 0.170, which is greater than 0.05.

d. Paired Sampel Test

Hypothesis testing analysis using the paired sample t-test (df = n-1). This analysis is used to determine the effectiveness of exercises without treatment in improving basic bowling cricket. The conclusion of the study is considered significant if the calculated t-value is greater than the t-table value and the p-value is less than 0.05. The results of the paired sample t-test analysis are presented in the following Table 9.

Tabel 7. Results of the Paired Sample Test

Paired Differences					t	df	Sig. (2-tailed)
Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
			Lower	Upper			
-1.400	.821	.184	-1.784	-1.016	-7.628	19	.000

Based on the results of the paired samples test analysis in the table above, it can be explained that the pretest-posttest data for the exercise without treatment to improve basic bowling cricket skills yielded a calculated t-value of -7.628 and a p-value of 0.000 < 0.05. Therefore, the hypothesis "the exercise model without treatment to improve basic bowling cricket" is accepted. After obtaining the descriptive results from the experimental and control classes, the next step in this study is to calculate the N-Gain value. This value is used to determine the extent of the

improvement difference between the class that received the treatment (experimental class) and the class that did not receive the treatment (control class). The improvement can be seen in the N-Gain table for basic bowling cricket techniques, which is presented in Table 10 below.

Table 8. N-Gain Test Results for Bowling Skills

Class	N	Maximal N-Gain	Minimal N-Gain	Average N-Gain	%
Experimental	30	0,76	0,27	0,58	58%
Control	24	0,67	0,10	0,30	30%

The results presented in Table 10 above show the difference in the descriptive outcomes obtained by the experimental and control classes. In the experimental class, for the basic bowling technique, the maximal N-Gain value was 0.76, the minimal N-Gain value was 0.27, the average N-Gain value was 0.58, and the average N-Gain percentage was 58%. Meanwhile, in the control class, the maximal N-Gain value was 0.67, the minimal N-Gain value was 0.10, the average N-Gain value was 0.30, and the average N-Gain percentage was 30%.

4. Discussion

Based on the research results outlined above, which focus on the development of a fun games-based cricket training model for basic bowling techniques, further tests were conducted, including validity tests by experts, as well as small and large group tests. Cricket itself is a sport that relies on a combination of physical skills, technique, and tactics. In this game, two teams, each consisting of eleven players, face off with the goal of scoring runs and preventing the opposing team from scoring. Although the game of cricket may seem to be played at a slow pace, there are key moments that require high-intensity movements, such as bowling, catching, and running between the wickets. Therefore, the bowling technique plays a critical role as it is the starting point for every action in the game.

The results of this study align with the views of who explained [34] that in cricket, there is a blend of long, low-intensity activities and short, high-intensity activities, such as when throwing or catching the ball. This means that cricket players must have good technical skills to perform these tasks effectively. In the context of this study, the improvement in bowling skills through play-based training indicates that basic technique learning can be more effective when presented in an engaging and contextual activity format. These findings also support previous research, which shows that systematic and regular training significantly impacts the improvement of basic skills in sports. Play-based training has been proven to improve motor skills, situational understanding, and concentration in children. Thus, it can be concluded that implementing a play-based training model not only improves bowling technique but also fosters motivation, self-confidence, and a competitive spirit in students.

The play-based training model provides children with the opportunity to learn bowling techniques in a fun way through activities that resemble real-game situations. With this approach, students not only practice the mechanical throwing motion but also understand the context in which the technique is applied in the game. Through repeated and varied practice, children's coordination, balance, and accuracy of movement improve.

Moreover, the competitive aspect of the game enhances students' enthusiasm and focus during training.

Based on these findings and discussions, the play-based training model is a worthy alternative strategy for training young cricket athletes. This approach effectively combines technical skills, tactics, and enjoyment into a meaningful learning process. Therefore, coaches and physical education teachers are encouraged to implement the play-based training model more widely in training programs, so that mastery of basic techniques, particularly bowling, can develop optimally from elementary school age. In other words, play-based training that is directed and sustained can bring about positive changes in children's bowling skills. This result proves that play-based training activities are effective for the development of cricket skills in young children because they align with children's motor development characteristics, which tend to be active, enjoy dynamic activities, and are easily motivated through the playful elements of the game.

5. Conclusions

After reviewing the data obtained and considering the various hypotheses proposed in this study, several conclusions can be drawn. First, the fun games-based cricket training model was proven to improve basic bowling skills for children aged 9–12 years, as evidenced by a calculated t-value of -76.879 and a p-value of $0.000 < 0.05$. Second, the model is practical for use in improving basic bowling skills in children in this age group, with average scores on each test falling within the practical category. Third, the model is effective in enhancing these skills, as demonstrated by pretest-posttest results showing a significant improvement, with a p-value of $0.000 < 0.05$. Finally, the play-based training model proved to be more effective than no treatment, as the average N-Gain for the experimental group (58.14%) was significantly higher than that of the control group (30.34%).

The findings of this study indicate that a training approach presented in the form of games can effectively increase student interest and active participation in the training process. Through play, children are able to learn bowling techniques in a more natural, enjoyable, and stress-free manner. Additionally, the play-based training model has been shown to help children master coordination, throwing strength, and ball accuracy. Therefore, this method is a valuable alternative strategy for developing young cricket athletes, as it not only improves technical skills but also promotes motivation, confidence, and a strong desire to learn among the participants.

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