

# A Local Wisdom Based Physical Education Learning Model to Enhance the Character and Health of Elementary School Students in Bima

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# A Local Wisdom Based Physical Education Learning Model to Enhance the Character and Health of Elementary School Students in Bima

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## Abstract

**Objectives:** This study aims to develop a physical education learning model based on local wisdom, utilizing the Contextual Teaching and Learning (CTL) approach, to enhance the character and health of elementary school students in Bima.

**Materials and Methods:** This study employed the Research and Development (R&D) method, adapting the Borg & Gall model. The research stages included a preliminary study, planning, initial product development, expert validation, limited trials, revision, field trials, and model refinement. The subjects consisted of 120 fourth and fifth-grade students, eight physical education teachers, and two expert validators. The instruments used were an expert validation questionnaire, an observation sheet, a physical fitness test, and a character questionnaire. Data were analyzed using feasibility percentages, implementation percentages, and paired t-tests.

**Results:** The research results indicate that the developed learning model possesses a high level of validity, with an average score of 88,67% (highly feasible). A limited trial demonstrated a 90,67% implementation rate, with teacher and student activities falling into the "Excellent" category and student responses being highly positive. In the field trial, students' character scores increased from 52 to 79, representing an absolute increase of 27 points or a relative increase of 51.92%. Meanwhile, physical fitness scores increased from 58 to 86, representing an absolute increase of 28 points or a relative increase of 48.28%. A paired-samples t-test indicated a statistically significant difference between the pre-test and post-test scores ( $p < 0.05$ ).

**Conclusions:** A physical education learning model based on local wisdom and utilizing the Contextual Teaching and Learning (CTL) approach meets the criteria of validity, practicality, and effectiveness. Integrating traditional Bima games offers a contextual learning alternative that supports the development of students' character and physical fitness.

**Keywords:** physical education; local wisdom; Contextual Teaching and Learning; traditional games; student character.

## Introduction

Physical education at the elementary school level plays an important role in supporting students' holistic development. Its objectives extend beyond the development of motor skills and physical fitness to include the formation of social and character competencies through active, collaborative, and structured physical activities (Huang, 2024; Jadwiszczak et al., 2025). Participation in physical education can provide opportunities for students to practice discipline, responsibility, cooperation, sportsmanship, and respect for others (Kaya & Yildiz, 2023). Thus, physical education should be designed not merely as physical exercise but as a learning experience that engages students physically, socially, and affectively (Afif et al., 2025; Aldiansah et al., 2025; Andriansyah et al., 2025; Pratiwi et al., 2024). This perspective is particularly important at the elementary school level because learning experiences during childhood can contribute to the development of positive behavioral patterns and attitudes.

The meaningfulness of physical education can be strengthened when learning activities are connected to students' everyday experiences and socio-cultural environments (Çakır et al., 2025; Xu et al., 2025). Contextual Teaching and Learning



(CTL) provides a relevant pedagogical framework because it emphasizes the connection between learning content and real-life situations (Ginting et al., 2021; Sarwari & Kakar, 2023; Tayo, 2025). Through contextual learning, students are encouraged to actively participate, relate new experiences to their existing knowledge, interact with others, and reflect on the meaning of their learning (Fletcher et al., 2025). In physical education, this approach can transform physical activities into meaningful learning experiences rather than activities that focus solely on the completion of motor tasks. Previous research has indicated that contextual approaches can increase student engagement and support learning that is more relevant to students' experiences (Nurzulianti et al., 2024; Risyanto et al., 2024). Therefore, CTL has considerable potential for designing physical education that simultaneously addresses physical and character development.

Local wisdom provides an additional opportunity to strengthen contextual physical education (Nurhikmah et al., 2022; S & Harigaran, 2026). Local wisdom represents values, practices, traditions, and knowledge that develop within a particular community and can function as an authentic learning resource (Anderson, 2024). Incorporating local cultural elements into learning can strengthen students' cultural identity while making learning more familiar and relevant to their lives (Fitrianto & Farisi, 2025; Purwaningsih & Ridha, 2024; Sadri & Temaja, 2025). In physical education, traditional games are particularly relevant because they naturally involve physical movement while also creating opportunities for interaction, cooperation, competition, discipline, and sportsmanship (Anjani et al., 2025; Suryadi et al., 2025). Consequently, traditional games can serve not only as recreational activities but also as pedagogical resources for integrating physical fitness and character education. Research has shown that culturally responsive physical education can contribute to students' social development and strengthen the relevance of learning to their cultural environments (Jahrir et al., 2024; Li et al., 2022).

Despite this potential, the integration of local wisdom into elementary physical education has not been systematically implemented in the context of Bima. The core problem identified in this study emerged from a preliminary study conducted in three elementary schools in Bima Regency. The findings indicated that physical education instruction was still predominantly conventional and focused on physical activities without systematically integrating local cultural values and character development. Among 78 students interviewed, 64% reported that physical education lessons were monotonous, while 72% of teachers reported difficulties in connecting learning materials with students' real-life contexts. Classroom observations further indicated that traditional games were rarely incorporated into physical education instruction, even though these games were widely known within the local community. These findings indicate a gap between the cultural resources available in the community and their utilization as meaningful learning resources in elementary physical education.

The problem is also reflected in the broader literature. Previous studies have established the potential of physical education to support character development through social interaction and active participation (Bailey, 2025; Kirk & Haerens, 2021). Studies on culturally relevant physical education have likewise emphasized the importance of connecting instruction with students' social and cultural environments (Li et al., 2022; Vasquez et al., 2022). Meanwhile, research on local wisdom has demonstrated its potential to strengthen cultural identity, cooperation, and other positive values among students (Purwaningsih & Ridha, 2024; Rasidi & Istiningsih, 2025; Sartini et al., 2025). Traditional games have also been reported to provide opportunities for social learning and character development (Miratunnisah, 2024; Nuryanti et al., 2025). However, these lines of research have generally examined local wisdom, physical fitness, or character



development separately, or have positioned local culture primarily as supplementary material rather than as a core component of the instructional model.

Another limitation concerns the availability of research-based instructional models that can be directly implemented by elementary school physical education teachers. Although model-based approaches have been increasingly promoted in physical education, their implementation remains strongly influenced by the social and cultural context of the learning environment (Bjørke & Casey, 2024). Previous local-wisdom-based learning studies have also tended to focus on general elementary education or other subject areas, while systematic applications in physical education remain relatively limited (Rachmawati et al., 2021; Susi et al., 2025). More specifically, research integrating CTL with traditional Bima games as a structured physical education learning model, while simultaneously addressing students' character and physical fitness, remains scarce. This gap provides a basis for developing a model that is not only culturally relevant but also pedagogically structured and empirically evaluated.

The novelty, or art of this study, lies in positioning Bima local wisdom as a fundamental component of the physical education learning model rather than merely as an additional learning medium. The developed model systematically integrates the CTL approach with traditional Bima games, particularly Ruba Kaca and Kareku Kande. These games were selected because they involve physical activities related to coordination, agility, and teamwork while containing values associated with togetherness, sportsmanship, and discipline. The model therefore connects three dimensions within a single instructional framework: physical fitness, character development, and local cultural values. In addition, the study does not merely propose the use of traditional games but develops a structured instructional package consisting of a lesson plan, teacher's guide, and student activity module.

The novelty is further reflected in the development and evaluation procedure. Rather than examining the effect of a traditional game as an isolated activity, this study uses a Research and Development approach adapted from Borg and Gall to produce and evaluate a complete instructional model. The model is subjected to expert validation, limited implementation, revision, and field testing to examine its validity, practicality, and effectiveness. Two experts, consisting of a physical education expert and a local culture expert, were involved in the validation process, while teachers and elementary school students participated in the implementation stages. This development-oriented design provides evidence not only regarding whether the learning activities produce positive outcomes but also whether the resulting model is feasible and practically implementable in elementary school settings.

The urgency of this research is strengthened by the need to develop physical education that responds simultaneously to physical, character, and cultural dimensions of elementary education. In the context of Bima, traditional games represent an existing cultural resource that can be transformed into meaningful educational experiences rather than remaining outside the formal learning process. The integration of these games through CTL may help address the problem of monotonous instruction while strengthening students' connection with their socio-cultural environment. Such an approach is also relevant to the broader direction of elementary education, which increasingly emphasizes active participation, collaboration, character development, and meaningful learning. Therefore, developing a validated and practical local wisdom-based physical education model is important for providing teachers with an instructional alternative that is both culturally responsive and oriented toward students' physical and character development.

Accordingly, this study aimed to develop and evaluate a local wisdom-based physical education learning model using the Contextual Teaching and Learning (CTL)



approach for elementary school students in Bima. Specifically, the study examined the validity, practicality, and effectiveness of the developed model in improving students' character and physical fitness. The theoretical contribution of this study is the extension of contextual physical education by demonstrating how local wisdom can function as a core pedagogical component within an instructional model. The practical contribution is the provision of a validated and practically implementable learning model, supported by instructional materials, that enables elementary school teachers to integrate traditional Bima games, physical fitness, character development, and cultural values into a coherent physical education learning process. Through this contribution, the study seeks to demonstrate that local cultural resources can be transformed into systematic learning experiences that support both physical development and character formation.

## Materials and Methods

### Study Design

This study employed a Research and Development (R&D) design adapted from the Borg and Gall model. The design was selected because the main objective of the study was to develop and evaluate a local wisdom-based physical education learning model that could be implemented in elementary schools. The development process focused on producing a learning model that was valid, practical, and potentially effective in improving students' character and physical fitness.

The development procedure consisted of eight stages: (1) preliminary study and needs analysis, (2) planning, (3) initial product development, (4) expert validation, (5) limited trial, (6) product revision, (7) field trial, and (8) final product refinement. The development process integrated the principles of Contextual Teaching and Learning (CTL) with traditional Bima games, particularly Ruba Kaca and Kareku Kande.

### Study Participants

The participants were 120 fourth and fifth-grade elementary school students aged 9-11 years from four elementary schools in Bima Regency, Indonesia. The students were selected using purposive sampling based on their suitability with the target users of the developed learning model. In addition, eight elementary school physical education teachers participated in the implementation and practicality evaluation. Two experts were involved in the validation process, consisting of one physical education/instructional expert and one expert in Bima local culture.

A preliminary needs analysis was conducted with 78 students and physical education teachers from three elementary schools. The preliminary information was used to identify problems in existing physical education instruction, students' characteristics, teachers' needs, and the potential of Bima traditional games as learning resources.

### Study Organization

#### Research Instruments

Four main instruments were used to collect the data.

#### 1. Expert Validation Questionnaire

An expert validation questionnaire was used to assess the quality and feasibility of the developed learning model. The instrument covered three aspects: content, language, and instructional design. The content aspect assessed the relevance of learning activities to physical education competencies, local wisdom, character development, and physical fitness. The language aspect assessed the clarity, appropriateness, and readability of the instructional materials for elementary school students and teachers. The design aspect assessed the organization, sequence, attractiveness, and practicality of the lesson plan, teacher's guide, and student activity module. The questionnaire was completed by the two experts involved in the validation process.

#### 2. Observation Sheet.



An observation sheet was used during the limited and field trials to assess the implementation of the learning model. The observation focused on teacher activities, student activities, and the extent to which the learning procedures were implemented according to the developed instructional materials. The observation also documented students' participation, cooperation, discipline, and sportsmanship during the traditional game activities. Field notes and teacher feedback were used as complementary qualitative information for product refinement.

### 3. Physical Fitness Test.

Students' physical fitness was assessed before and after implementation of the learning model. The physical fitness assessment consisted of a 20-meter run, push-ups, sit-ups, and a shuttle run. These tests were used to obtain an overall description of students' physical fitness before and after participating in the local wisdom-based physical education learning activities.

### 4. Student Character Questionnaire.

A character questionnaire was administered before and after the implementation of the learning model. The questionnaire assessed four character dimensions emphasized in the developed learning activities: discipline, cooperation, sportsmanship, and responsibility. The questionnaire was designed to capture students' character-related behaviors associated with participation in individual and group physical education activities and traditional games.

The instruments were reviewed by experts before their use in the study. Instrument reliability was assessed using Cronbach's Alpha for the questionnaire-based instruments. The reliability coefficient obtained from the analysis should be reported in the final manuscript as evidence of the internal consistency of the character questionnaire and other applicable questionnaire items.

## Research Procedure

The research procedure was conducted in eight sequential stages.

### Stage 1: Preliminary Study and Needs Analysis.

The researchers conducted observations and interviews at three elementary schools in Bima Regency to identify problems in existing physical education instruction. Information was collected from students and physical education teachers concerning learning activities, student engagement, contextualization of learning materials, character development, and the use of traditional games. The researchers also identified traditional Bima games that had potential as physical education learning resources.

### Stage 2: Planning.

The findings from the preliminary study were analyzed to determine the characteristics of the learning model. The researchers formulated learning objectives and selected traditional Bima games that were relevant to physical activity and character development. Ruba Kaca and Kareku Kande were selected because their activities involve coordination, agility, teamwork, and interaction among students. The principles of CTL were subsequently integrated into the learning sequence so that students could connect physical activities with their everyday experiences and local cultural environment.

### Stage 3: Initial Product Development.

An initial prototype of the learning model was developed in the form of three complementary instructional products: a lesson plan, a teacher's guide, and a student activity module. The learning activities were organized to include contextual connection, participation in traditional games, exploration of movement skills, collaborative activities, and reflection on character values.

### Stage 4: Expert Validation.



The initial product was submitted to two experts for evaluation. The experts assessed the content, language, and instructional design of the model and provided qualitative suggestions for improvement. The percentage scores and expert comments were analyzed to identify aspects requiring revision before classroom implementation.

Stage 5: Limited Trial.

After revision based on expert feedback, the model was implemented in a limited trial involving 25 fourth-grade students. During this stage, researchers observed teacher and student activities and collected student responses and teacher feedback. The results were used to determine the practicality and clarity of the instructional procedures in an actual classroom setting.

Stage 6: Product Revision.

The researchers revised the learning model based on the findings from the limited trial. Revisions focused particularly on the clarity of activity instructions, the sequence of learning activities, and the practicality of implementing the traditional games in elementary school physical education.

Stage 7: Field Trial.

The revised learning model was implemented with 120 fourth- and fifth-grade students from four elementary schools in Bima Regency. Students completed the character questionnaire and physical fitness tests before and after the implementation of the model. Classroom implementation was also observed to assess the practicality of the model.

Stage 8: Final Product Refinement.

The quantitative and qualitative findings from the field trial were reviewed to determine the strengths and limitations of the developed model. The final product consisted of a local wisdom-based physical education learning model integrating CTL principles with traditional Bima games, supported by a lesson plan, teacher's guide, and student activity module.

### Statistical Analysis

The data were analyzed using descriptive and inferential procedures. Expert validation scores were converted into percentages to determine the feasibility of the developed model. Implementation data from the observation sheets were summarized as percentages of achieved indicators to determine the practicality of the model.

Pre-test and post-test scores for students' character and physical fitness were compared to determine changes following implementation of the learning model. A paired-samples t-test was used to examine whether the differences between pre-test and post-test scores were statistically significant. The significance level was set at 0.05. Qualitative information obtained from observations, field notes, teacher feedback, and expert comments was used to support interpretation of the quantitative findings and to inform revisions of the learning model.

### Results

This study presents findings from a series of validation stages, limited trials, and field tests conducted to develop a physical education learning model based on local wisdom. The data obtained not only reflect the model's feasibility in terms of content, language, and design but also demonstrate a high level of implementation, positive acceptance by teachers and students, and significant improvements in character and physical fitness.

#### 1. Preliminary Study

The preliminary study was conducted in three elementary schools in Bima Regency to identify problems in existing physical education practices, students' learning



experiences, teachers' needs, and the potential use of local traditional games. The needs analysis involved 78 students and physical education teachers.

The findings indicated that physical education learning was still dominated by conventional activities and had not optimally integrated local cultural values or character development. Among the 78 students interviewed, 64% perceived physical education lessons as monotonous. In addition, 72% of teachers reported difficulties in connecting physical education materials with students' everyday experiences. Classroom observations also showed that traditional Bima games were rarely used as instructional activities despite their familiarity within the local community.

These findings became the basis for developing a contextual physical education learning model that integrates local traditional games into regular learning activities rather than treating them merely as supplementary recreational activities.

## 2. Development of the Local Wisdom-Based Learning Model

Based on the needs analysis, the researchers developed a physical education learning model based on Contextual Teaching and Learning (CTL) and integrated two traditional Bima games, namely Ruba Kaca and Kareku Kande.

The learning model was designed to connect students' prior experiences and local cultural environment with physical education activities. Ruba Kaca and Kareku Kande were selected because the activities involve coordination, agility, teamwork, and repeated physical movement while simultaneously providing opportunities to practice cooperation, discipline, sportsmanship, and responsibility.

The developed instructional package consisted of three main components: (1) a lesson plan, (2) a teacher's guide, and (3) a student activity module. The learning sequence included contextual connection, explanation and demonstration of the traditional games, active participation, collaborative interaction, reflection, and reinforcement of character values.

## 3. Expert Validation

The initial learning model was evaluated by two experts, consisting of a physical education expert and a local culture expert. The validation covered content, language, and instructional design. The content aspect obtained a feasibility score of 90%, while the language and design aspects obtained scores of 87% and 89%, respectively. The overall average validation score was 88.67%, which was categorized as highly feasible. The expert validation results are detailed in Table 1 below.

**Table 1.** Expert Validation Results of the Learning Model

| No. | Aspect Evaluated | Average Score (%) | Category        |
|-----|------------------|-------------------|-----------------|
| 1   | Content          | 90.00             | Highly Feasible |
| 2   | Language         | 87.00             | Highly Feasible |
| 3   | Design           | 89.00             | Highly Feasible |
|     | Overall Average  | 88.67             | Highly Feasible |

The experts' qualitative feedback primarily concerned the clarity and simplicity of activity instructions for elementary school students. The product was subsequently revised before the limited trial.

## 4. Limited Trial

The revised model was tested with 25 fourth-grade students. The limited trial assessed teacher activity, student activity, and student responses to the learning model.

The teacher activity score reached 90%, student activity reached 94%, and student response reached 88%. The overall average was 90.67%, which was categorized as excellent. Detailed results of the limited trial are presented in Table 2 below.



**Table 2.** Practicality Test Results of the Learning Model

| No. | Indicator        | Implementation Percentage (%) | Category  |
|-----|------------------|-------------------------------|-----------|
| 1   | Teacher Activity | 90.00                         | Excellent |
| 2   | Student Activity | 94.00                         | Excellent |
| 3   | Student Response | 88.00                         | Excellent |
|     | Overall Average  | 90.67                         | Excellent |

Observation and teacher feedback indicated that the learning activities could be implemented without substantial modification. Students also demonstrated active participation, cooperation during group activities, and sportsmanship during the traditional games.

#### 5. Field Test

The field test involved 120 fourth- and fifth-grade students from four elementary schools in Bima Regency. Two primary outcomes were examined: students' character and physical fitness.

The descriptive results showed an increase in both outcomes following implementation of the learning model. The average character score increased from 52 at pre-test to 79 at post-test, representing an absolute increase of 27 points. Similarly, the average physical fitness score increased from 58 to 86, representing an absolute increase of 28 points.. The field test results are presented in Table 3.

**Table 3.** Learning Model Effectiveness Test Results

| No. | Aspect Measured   | Initial Mean Score (%) | Final Mean Score (%) | Mean Difference | Relative Increase (%) |
|-----|-------------------|------------------------|----------------------|-----------------|-----------------------|
| 1   | Student Character | 52.00                  | 79.00                | 27.00           | 51.92                 |
| 2   | Student Fitness   | 58.00                  | 86.00                | 28.00           | 48.28                 |

**Table 4.** Effectiveness Test Results of the Learning Model

| No. | Aspect Measured   | Initial Mean Score (%) | Final Mean Score (%) | Mean Difference | Relative Increase (%) |
|-----|-------------------|------------------------|----------------------|-----------------|-----------------------|
| 1   | Student Character | 52.00                  | 79.00                | +27.00          | 51.92                 |
| 2   | Student Fitness   | 58.00                  | 86.00                | +28.00          | 48.28                 |

The descriptive findings indicate that the largest relative increase was observed in students' character scores, while physical fitness also demonstrated a substantial improvement after implementation of the model.

#### 6. Comparison of Pre-test and Post-test Results

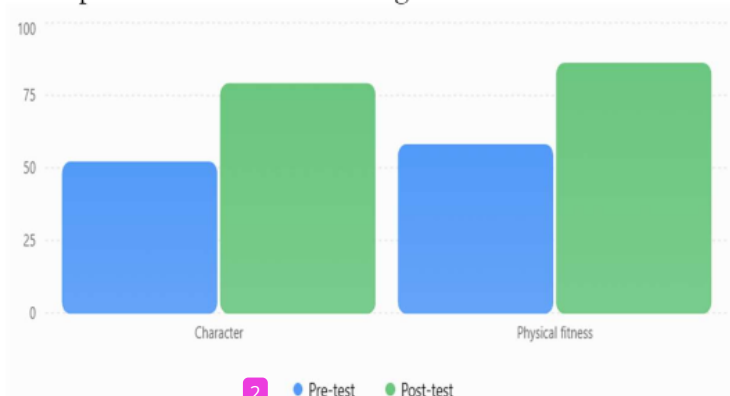
The paired-samples t-test indicated statistically significant differences between students' pre-test and post-test scores for both character and physical fitness ( $p < 0.05$ ). These findings indicate that students demonstrated higher character and physical fitness scores after participating in the local wisdom-based physical education learning activities.

However, because the study employed a pre-test-post-test design without a separate control group, the findings should be interpreted as evidence of improvement following implementation rather than definitive evidence that the learning model alone caused the observed changes.



## 7. Visual Representation of the Findings

Figure 1 presents the changes in the average character and physical fitness scores before and after implementation of the learning model.



2 Figure 1. Pre-test and Post-test Outcomes

## Discussion

### Improvement of Students' Character

4 The implementation of the local wisdom-based physical education learning model demonstrated a positive contribution to the development of students' character. The average character score increased from 52 in the pre-test to 79 in the post-test, indicating an improvement of 27 points. This improvement may be associated with the learning activities that integrated traditional games, cooperation, discipline, responsibility, honesty, and sportsmanship. Traditional games provide opportunities for students to interact directly with their peers, follow agreed rules, demonstrate fair play, and take responsibility for individual and group tasks. These activities are consistent with the view that physical education can be used as a medium for character development through structured movement activities and social interaction (Jahrir et al., 2024).

6 The findings are also in line with previous studies emphasizing the importance of character education in elementary schools. Miratunnisah (2024) explained that character values can be strengthened through learning activities that involve habituation, cooperation, responsibility, and positive social behavior. Similarly, Nuryanti et al. (2025) reported that learning activities designed around students' social participation and contextual experiences can support the development of positive character. Purwaningsih and (Purwaningsih & Ridha, 2024) also emphasized that educational activities should provide meaningful experiences that encourage students to practice moral and social values in real situations.

In the present study, the use of traditional games from the local cultural context of Bima helped make character education more concrete and relevant to students' daily lives. Through these games, students were not only physically active but also learned to respect others, follow rules, cooperate with team members, and accept winning or losing appropriately. Therefore, local wisdom-based physical education can serve as an effective approach for integrating character education into elementary school learning.

### 22 Improvement of Students' Physical Fitness

22 The results also showed an improvement in students' physical fitness. The average physical fitness score increased from 58 in the pre-test to 86 in the post-test, representing an increase of 28 points. The statistical analysis indicated a significant difference between the pre-test and post-test scores ( $p < 0.05$ ). This result suggests that the learning model provided sufficient opportunities for students to engage in active



movement, including running, jumping, changing direction, balancing, and other fundamental motor activities.

26 These findings support the results of Suryadi et al. (2025), who explained that traditional games can be used as an alternative strategy to stimulate physical fitness among elementary school students. Traditional games generally involve repeated movement, agility, speed, coordination, endurance, and body control. Because the activities are presented in a playful and culturally familiar form, students may participate more actively and experience less boredom during the learning process.

The improvement in physical fitness may also be related to the characteristics of traditional games, which require students to move continuously and respond to changing situations. In contrast to learning activities that focus mainly on verbal instruction, traditional games provide direct and enjoyable physical experiences. This approach is particularly appropriate for elementary school students, who generally learn more effectively through active participation, play, and concrete experiences.

#### Integration of Character Education and Physical Fitness

One of the important contributions of this learning model is its integration of character development and physical fitness within the same learning activity. Physical education is not limited to the development of physical abilities but can also support students' social, emotional, and moral development. Jahrir et al. (2024) stated that physical education and sports have an important role in strengthening character values because students learn through direct experiences involving rules, cooperation, responsibility, and fair play.

11 The integration of local wisdom into physical education also makes the learning process more culturally responsive. Li et al. (2022) explained that culturally responsive pedagogy can improve the relevance of learning by connecting educational activities with students' cultural backgrounds and lived experiences. In the context of this study, the use of traditional games from Bima provided a familiar cultural setting that enabled students to understand the learning activities more easily and participate more confidently.

The use of contextual learning principles also supports this integration. Contextual Teaching and Learning emphasizes the relationship between learning materials and students' real-life experiences (Mutiara et al., 2025). In addition, Sarwari and Kakar (2023) highlighted the importance of meaningful and contextual learning experiences in helping students connect classroom activities with their social and cultural environment. Therefore, local wisdom-based physical education can be understood as a contextual learning approach that develops physical fitness while simultaneously strengthening character.

#### 4 Contribution of the Learning Model

The findings indicate that the developed model offers a practical contribution to elementary school physical education. The model combines physical activities, traditional games, local cultural values, teamwork, and character education in one learning framework. This approach is consistent with the models-based practice perspective, which emphasizes the use of structured learning models to achieve broader educational outcomes in physical education (Rachmawati et al., 2021).

The use of local wisdom is particularly important because it can increase students' engagement and make learning more meaningful. Traditional games are relatively accessible, require limited equipment, and can be adapted to the school environment. They also provide opportunities for students to learn through direct participation rather than through explanation alone. Consequently, the model may be



useful for teachers who seek to improve students' physical fitness while also developing discipline, cooperation, responsibility, honesty, and sportsmanship.

Nevertheless, the findings should be interpreted within the limitations of the study. The improvement in the pre-test and post-test scores indicates positive changes after the implementation of the model, but further research involving a control group, a larger sample, and a longer intervention period is needed to determine the effectiveness of the model more rigorously. Future studies may also examine which specific traditional games contribute most strongly to character development and physical fitness.

## Conclusions

This study concludes that the developed physical education learning model based on local wisdom and utilizing the Contextual Teaching and Learning (CTL) approach meets the criteria for validity, practicality, and effectiveness. The model has proven capable of enhancing student character, particularly regarding discipline, cooperation, and sportsmanship, while also improving student health, as evidenced by physical fitness and active engagement in learning activities.

Integrating local wisdom through traditional games provides a contextual and meaningful learning experience, thereby strengthening the link between physical activity and character development. The CTL approach also fosters greater student engagement by connecting learning to real-life experiences and the students' socio-cultural environments.

Theoretically, this study contributes to the development of physical education models that integrate a contextual approach with local cultural values. Practically, the resulting model offers an innovative alternative for teachers to design instruction that focuses not only on physical skills but also on holistic character building and student health.

However, this study has several limitations. First, the study was conducted with a limited number of elementary school students in a restricted geographical area in Bima. Therefore, the findings may not be generalizable to students from different regions, schools, or cultural backgrounds. Second, the study used a pre-test and post-test design without a comparison or control group. Consequently, the improvement in students' scores cannot be attributed exclusively to the learning model because other factors may also have influenced the results. Third, the intervention period and follow-up assessment were limited, so the long-term sustainability of the improvements in character and physical fitness could not be determined. Finally, the analysis focused mainly on changes in average scores and statistical significance; further analytical methods may be required to examine the magnitude of the effect and the relationship between the learning activities and students' outcomes.

Based on these limitations, future research should involve a larger and more diverse sample from several schools and regions to improve the generalizability of the findings. Research are also recommended to use a quasi-experimental or randomized controlled design involving an experimental group and a control group. Further studies should apply longer intervention periods and follow-up assessments to determine whether the improvement in students' character and physical fitness can be maintained over time. In addition, future research may examine the effectiveness of specific traditional games, compare different local wisdom-based activities, and use more comprehensive analytical methods, such as effect size analysis and multivariate analysis. Qualitative data from classroom observations, teacher interviews, and student reflections may also be collected to provide a deeper understanding of how local wisdom-based physical education influences students' character development and learning engagement.



Nevertheless, further research with stronger research designs, larger samples, broader locations, and more comprehensive analyses is needed to confirm and extend the results of this study.

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#### **11** **Conflict of Interest**

The authors declare no conflict of interest.

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