

# Development of a Physical Education Learning Model Based on Geo-Traditional Games

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ARTICLE INFO	ABSTRACT
<p><b>Keywords:</b></p> <p>physical education; traditional games; learning development; geo game; cultural pedagogy</p> <hr/> <p><b>Article history:</b></p> <p>Received 2025-04-23 Revised 2025-09-17 Accepted 2025-12-31</p>	<p>Traditional games in physical education (PE) are underutilized, limiting students' exposure to local cultural values and hindering the development of fundamental motor and social skills. This study aims to develop and validate a physical education learning model based on <i>Geo</i>, a traditional game from the Bima community, to enhance motor skills, focus, and cooperation among elementary students. This research employed the ADDIE development model—Analysis, Design, Development, Implementation, and Evaluation. Participants included two PE academics, two PE teachers, and 30 elementary school students in both small- and large-scale trials. Instruments included interviews, questionnaires, and observations. Validation data were analyzed using Aiken's V formula to assess content validity. Expert validation showed very high content validity for both the learning module (<math>V = 0.95</math>) and the game model (<math>V = 0.92</math>). In the small-scale trial, student scores averaged 74.25 (motor skills), 73.25 (focus), and 75.5 (cooperation). These improved significantly in the large-scale trial to 93.83, 93.66, and 94.50, respectively. Statistical analysis indicated a significant difference (<math>p &lt; 0.001</math>) and large effect sizes (Cohen's <math>d &gt; 2.5</math>). The Geo-based learning model proved effective in improving students' physical and social competencies. It also supports the integration of cultural elements into PE instruction, making learning more contextual, engaging, and meaningful. This model is a viable alternative for culturally responsive PE learning and contributes to preserving local traditions.</p>
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## 1. INTRODUCTION

Traditional games play an important role in physical education because they combine elements of physical activity, character development, and the preservation of local cultural values. Meaningful physical education should not only emphasize motor skills but also connect them with students' daily experiences so that learning becomes more contextual and enjoyable (O'Connor & Penney, 2021). Games based on local wisdom represent distinctive characteristics or unique features of a region that must be preserved (Ali et al., 2024). Traditional games, as part of local wisdom, have been proven effective in fostering cooperation, sportsmanship, and physical fitness among students (Mujriah et al., 2022).

However, in practice, the use of traditional games in schools tends to decline. The development of modern and digital games has caused students to become less familiar with, and even reluctant to play, traditional games that contain rich cultural meaning (Makorohim et al., 2022). On the other hand, physical education teachers still face limitations in integrating traditional games into the learning process, resulting in their potential as a medium for improving basic movement skills and social attitudes not being optimally utilized (Nurhikmah et al., 2022).

Local wisdom-based learning has not been maximized, resulting in meaningless learning. The current school education process is characterized by the dominance of outdated approaches and stereotypical, classical forms of learning (Shiver et al., 2020). These outdated approaches create boredom for students, so teachers must create a game- and sports-based learning environment to guide physical education instruction in schools (O'Connor et al., 2024). Several studies have shown that traditional games can strengthen character values (Asrial et al., 2021), improve students' motor skills (Handayani et al., 2024), and facilitate positive social interactions (Hartanto et al., 2021). However, previous research has focused more on the general application of games without developing structured learning models. This gap highlights the need for innovation in the form of developing traditional game-based physical education learning models that are systematic, contextual, and tailored to the characteristics of elementary school students.

In the local context, the traditional game of the Bima community, known as *geo*, holds great potential as a medium for physical education learning. This game not only requires basic motor skills but also trains focus, teamwork, and fosters discipline and sportsmanship. Unfortunately, *geo* games are rarely used as a formal learning model in schools. Based on this background, this study aims to develop a physical education learning model based on traditional *geo* games that can improve basic motor skills, focus, and teamwork in elementary school students. Therefore, it is hoped that the results of this study will make a tangible contribution to cultural preservation efforts and innovation in physical education learning in Indonesia.

## 2. METHOD

This research design employed a Research and Development (R&D) method based on the (Borg, 1989) model and combined with (Sugiyono, 2019) approach. This design was chosen because it is relevant for producing educational products in the form of learning models that are systematically tested through expert validation and field trials. The development model used is ADDIE (Analysis, Design, Development, Implementation, Evaluation), widely recognized in learning development research for its systematic, flexible, and adaptable procedures (Junaedi, 2019). The research sample and participation were conducted through purposive sampling of experts: two physical education academics as learning material experts and two physical education teachers as traditional game experts.

The total number of experts was four, based on recommendations in R&D research that state that two to three experts are sufficient for content validation, while four experts provide a higher degree of reliability. Student participation in the pilot study was conducted on 30 elementary school students (small group pilot study), and the large-scale pilot study also involved 30 students in a broader classroom context. This number was considered based on population representativeness, subject availability, and minimum standards for elementary-level physical education research (Creswell, 2019).

The research instruments used in this study include: 1) Interviews, used to explore the opinions of teachers and experts regarding the suitability of content, practicality of the game, and feasibility of implementation. 2) Questionnaires contain indicators regarding aspects of material, game models, language, facilities, and achievement of learning objectives. And the assessment scale uses a Likert scale of 1-5 (very inappropriate to very appropriate). 3) Observations conducted during the trial of traditional games in the classroom, and the focus of observations includes basic movement skills, student focus, and cooperation. 4) Validity, Content validation is carried out by experts through expert judgment, and validation data are analyzed using Aiken's V to ensure consistency between experts. The stages of model development (ADDIE) include: 1) Analysis, Identification of physical education learning needs, curriculum analysis, and the needs of elementary school students for traditional games. 2) Designing a learning model based on traditional *Geo* games, including lesson plans, modules, and evaluation instruments. 3) Development, The initial product is validated by material experts and game experts, and revisions are made based on expert input. 4) Implementation: The product was tested on a small and large scale on elementary school students, with teachers acting as facilitators. 5). Evaluation:

Formatif evaluation was conducted at each stage (expert validation, small trials, and large trials). Summative evaluation was conducted through analysis of student skill improvement (basic movements, focus, and cooperation). Validation analysis using Aiken's formula was used:

$$V = \frac{\sum S}{n(c-1)}$$

Interpretation criteria 0.80–1.00 = Very High, 0.60–0.79 = High, 0.40–0.59 = Moderate, 0.20–0.39 = Low, 0.00–0.19 = Very Low (Joseph F. Hair, 2019).

### 3. FINDINGS AND DISCUSSION

#### 3.1. Findings

##### 3.1.1 Analysis

Analysis of the physical education learning model based on traditional geo games is a traditional game of the Bima community that produces a module as a reference for teachers in implementing teaching and learning activities in schools. The traditional geo game learning module explains the stages of learning, preliminary learning activities, core learning activities, and closing activities. The steps of the traditional geo game model, facilities and infrastructure, and assessment reference forms. Table 1 Validation data analysis of the physical education learning module based on geo games. The material aspect of the validation results of expert one obtained a value of 6, the validation results of expert two obtained a value of 6, and the final number of validations was 0.7, which means that the module material predicates high. The traditional game model aspect of the validation results of expert one obtained a value of 10, the validation results of expert two obtained a value of 11, and the final number of validations was 0.7, which means that the traditional game model predicts high. The language aspect of the validation results for expert one was 6, the validation results for expert two were 16, and the final number of validations was 0.7, which means that the language predicate has a high aspect.

**Table 1.** Module Analysis Validation Data

Aspect	S1	S2	SS	n(c-1)	V	Predicate
Material	6	6	12	16	0.7	High
Traditional Game Model	10	11	21	32	0.7	High
Language	6	6	12	16	0.7	High

This indicates that the module content is relevant, but still requires refinement in the consistency of terminology and the systematic gameplay. These findings support (Shiver et al., 2020) that clarity of instructions is a critical aspect in designing culture-based physical education.

##### 3.1.2 Design

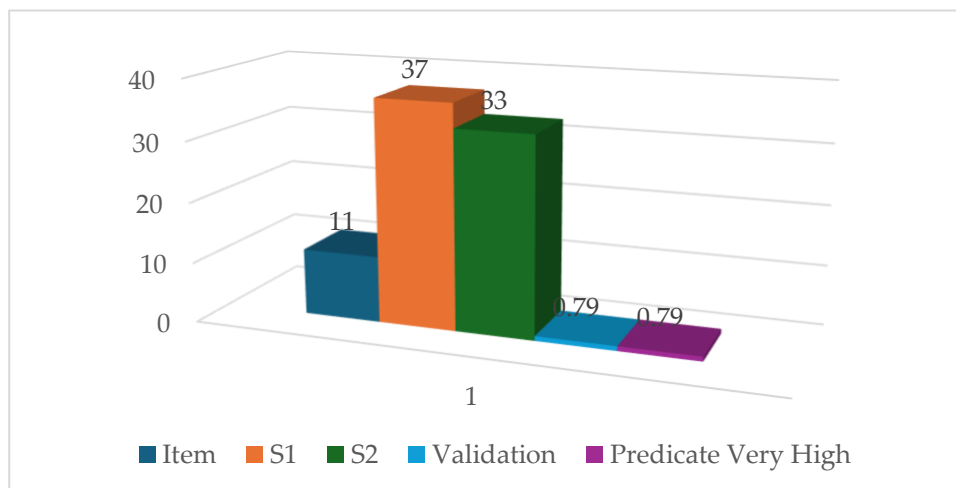
At the design stage, the learning module received a very high rating ( $V=0.92$ ). This means that the learning instruments (lesson plans, game guides, and evaluation instruments) were deemed appropriate for the curriculum and easily understood by both teachers and students. The clarity of language and the availability of infrastructure strengthened implementation readiness. These results align with findings (Ali et al., 2024) that emphasize the importance of integrating local wisdom into the curriculum for more contextualized learning.

**Table 2.** Product Design Validation Results

S1	S2	SS	n(c-1)	V	Predicate
30	29	59	64	0,92	Very high

### 3.1.3 Development

Expert validation showed an improvement from the initial product ( $V = 0.78-0.79$ ; high category) to the revised product ( $V = 0.92-0.95$ ; very high category). The revision improved the clarity of language, the systematicity of game stages, and the assessment indicators for basic motor skills. These results demonstrate the importance of involving subject matter experts and practitioners in ensuring the reliability of the development instrument (Joseph F. Hair, 2019).

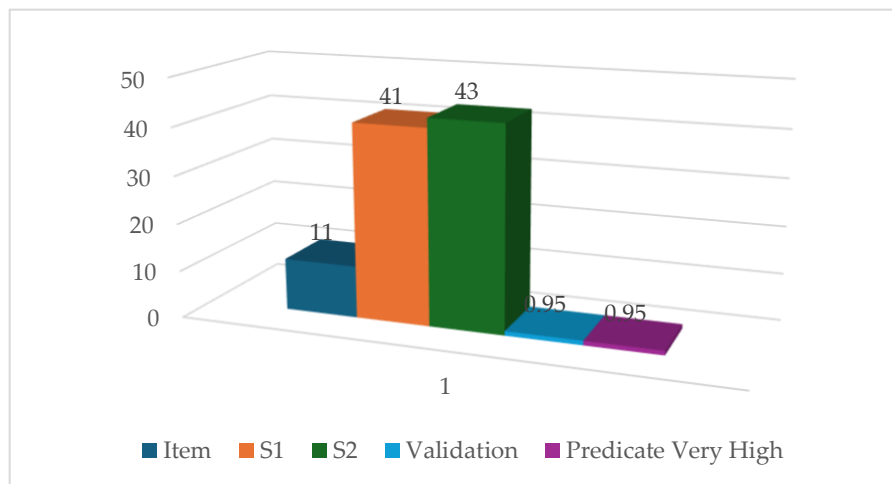


**Figure 1.** Initial Product Expert Assessment Results Diagram

The results of the initial product expert assessment can be explained by the fact that the validation value for the learning material expert (S1) was 11 question items, S1 total score 37, learning material expert (S2) total score 33, validation average 0.79, so it can be explained that the assessment of the initial product learning expert S1 and S2 was a high predicate.

**Table 3.** Results of Expert Assessment of Revised Product Learning

Aspects	Indicator	1	2	S1	S2	V	Predicate
Clarity	How to fill out the questionnaire	5	5	4	4	1	Very high
	Easy-to-understand questions	5	5	4	4	1	Very high
	Obvious questions	5	5	4	4	1	Very high
Similarities	Research objectives	4	5	3	4	0.875	Very high
	What is achieved	5	5	4	4	1	Very high
	Learning	4	5	3	4	0.875	Very high
	Geo Games	5	4	4	3	0.875	Very high
	Basic motion indicators	4	5	3	4	0.875	Very high
Language	Language is easy to understand	5	5	4	4	1	Very high
	Effective language	5	5	4	4	1	Very high
	based on EYD guidelines	5	5	4	4	1	Very high

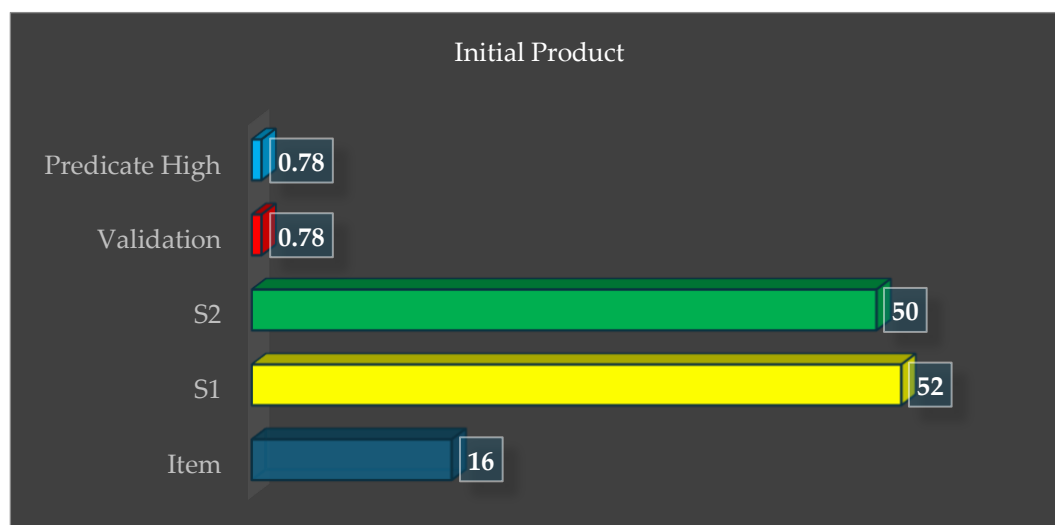


**Figure 2.** Diagram of Expert Assessment Results for Revised Products

The results of the expert assessment of the revised product can be explained that the validation value for the learning material expert (S1) is 11 question items, S1 total score 41, learning material expert (S2) total score 43, average validation 0.95, so it can be explained that the expert assessment of the revised product learning S1 and S2 is a very high predicate. Next, the results of the traditional game expert assessment are explained, which include expert validation of the initial product and the revised product..

**Table 4.** Results of the Revised Game Expert Assessment

Item	Assessment	S1	S2	SS	n(c-1)	V	Predicate	
1-'16	1	2	52	50	69	88	0,78409091	High

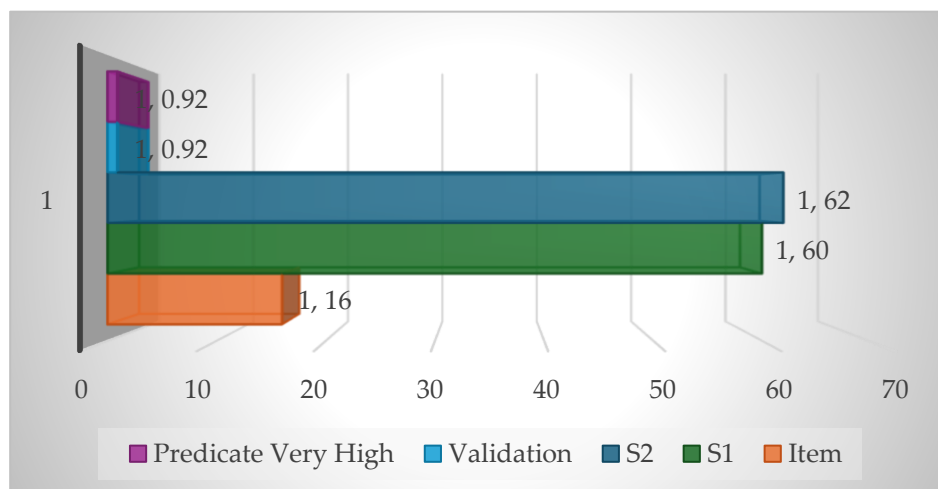


**Figure 3.** Diagram of expert assessment results for initial traditional game products

Table 4 and Figure 3 can be explained that the validation value of the game expert (S1) with the number of questions 16, the results of the expert test (S1) got a value of 52, the game expert (S2) got a value of 50, the average value was 88, the final validation value was 0.78, so it can be explained that the assessment of the game expert for the initial product S1 and S2 is a high predicate, meaning that in the initial product it is necessary to refine the question items about the geo game model in elementary school physical education learning, the results of the product revision will be subjected to a game expert validation test at the final stage.

**Table 5.** Results of the Revised Game Expert Assessment

Item	Assessment	S1	S2	SS	n(c-1)	V	Predicate	
1-16	1	2	60	61	81	88	0.92045455	Very high

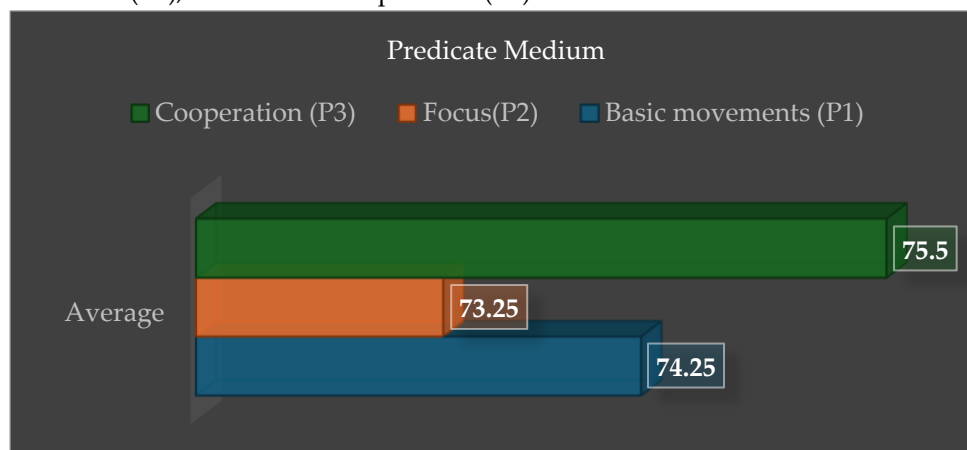


**Figure 4.** Diagram of the Results of the Revised Traditional Games Expert Assessment

Table 5 and Figure 4 can be explained that the validation value of the game expert (S1) with the number of questions 16, the expert test results (S1) got a value of 60, the game expert (S2) got a value of 61, the average value was 88, the final validation value was 0.92, so it can be explained that the assessment of the game expert for the revised product S1 and S2 is a very high predicate, meaning that the revised product provides a very good product and has very high feasibility regarding the geo game model in elementary school physical education learning.

**3.1.4 Implementation**

Implementation of initial product trials or small-scale trials of the traditional geo game learning model, which was tested on 30 subjects with an average value of 74.25 for basic movement activities (P1), 73.25 for focus (P2), and 75.5 for cooperation (P3).



**Figure 5.** Small-Scale Trial Diagram of Traditional Games

Implementation of the final product trial or large-scale trial of the traditional geo game learning model tested on 30 subjects with an average value of 93.83 for basic movement activities (P1), 93.66 for focus (P2), and 94.50 for cooperation (P3).

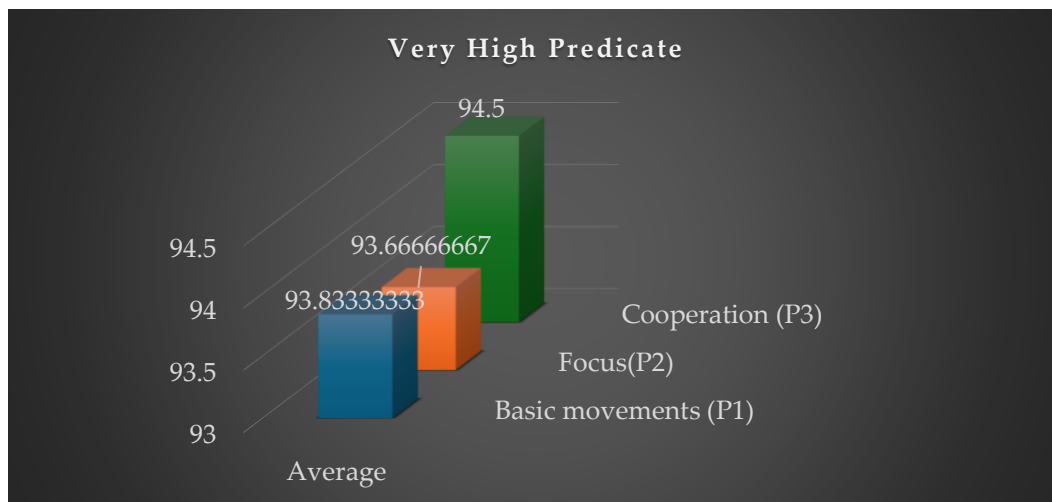


Figure 6. Large-Scale Trial Diagram of Traditional Games

Table 6. Summary of Geo Game Implementation Results

Aspects	Small Trial	Large Trial	Improvement	Interpretation
Basic Movement	Medium	Very High	+20 points	Students became more skilled at performing locomotor, non-locomotor, and manipulative movements.
Focus	Medium	Very High	+21 points	Concentration improved because the game required strategy and turn anticipation.
Teamwork	Medium	Very High	+19 points	Team interaction and coordination improved significantly.

Paired t-test analysis showed significant differences ( $p < 0.001$ ) in all three aspects. The effect size (Cohen's  $d = 2.5-3.0$ ) was very large, indicating that Geo games had a strong impact on students' motor and social skills. These results indicate that familiarization and repetition play a crucial role in the success of Geo game-based learning (Santoso et al., 2024)

### 3.1.5 Evaluation

Evaluation of the initial product of the learning material expert and the revised product of the game expert on the physical education learning module based on traditional geo games for elementary school students found that: 1) The learning module achieved very high content validity ( $V \geq 0.90$ ). 2) Implementation significantly improved physical (basic movements) and social (focus, cooperation) skills. The main obstacle in the form of limited Geo equipment can be overcome by adapting local materials that are more easily accessible.

### 3.2. Discussion

The results of this study showed significant improvements between small and large trials in elementary school students' basic motor skills, focus, and teamwork through the traditional Geo game. This improvement confirms previous research findings that traditional games are an effective learning medium for developing children's motor and social skills (Mujriah et al., 2022). Expert validation, which yielded very high scores, also confirmed that the Geo game-based learning model has good feasibility for implementation in elementary schools. The traditional Geo game is unique because it integrates physical and social elements in a balanced manner. This differs from some other traditional games that emphasize only one aspect. For example, the Patok Lele game, widely studied in Indonesia, has been shown to improve motor skills, but the social aspect is not always the primary focus (Syahrial et al., 2021; Rohmah, 2022). In Geo games, team coordination, concentration, and strategy are integral parts of the game process, so students are trained not only in motor skills but also in social values such as

cooperation, sportsmanship, and communication. Thus, Geo games have a comparative advantage over other traditional games in the context of physical education learning.

The findings of this study also support the direction of national education policy, which emphasizes strengthening culturally relevant physical education learning to meet students' needs (Shiver et al., 2020). Through Geo games, students can internalize the values of mutual cooperation, global diversity, and independence. The game process involves rules, turns, and strategy, which teach students about discipline, responsibility, and decision-making skills. Thus, Geo games can be a holistic learning tool that not only improves physical skills but also builds students' character. From a physical education theory perspective, traditional games such as Geo can be categorized as a culture-based learning approach. (Wyant et al., 2020) emphasize the importance of cultural competence in physical education, where students are introduced to local practices that have pedagogical value. This approach is relevant in the context of globalization, which often erodes local traditions. Through Geo games, students not only learn movement but also understand local cultural identities that are part of the nation's heritage. Furthermore, the integration of traditional games into physical education learning can increase student learning motivation. Many studies have shown that traditional games are more enjoyable and contextual than conventional methods (Asrial et al., 2021; Handayani et al., 2024). In this study, students' motivation increased, as evidenced by their enthusiasm during the implementation of the Geo game. This aligns with learning motivation theory, which states that emotional and social engagement in learning can improve retention and the quality of learning outcomes (Fernandez-Rio & Casey, 2021).

Compared with international findings, traditional games also play a significant role in improving children's motor and social skills in various countries. A study in Spain (Martínez-Santos et al., 2020) emphasized that traditional games serve not only as physical activity but also as a medium for character education. By participating in traditional games, students can understand and appreciate cultural heritage and broaden their horizons about cultural diversity (Aliriad et al., 2024). Furthermore, research in South Korea (Kwon et al., 2022) indicates that parents view the integration of cultural elements into physical education as crucial for strengthening children's engagement. This reinforces the study's findings that Geo games have relevance not only locally but also globally. Methodologically, this study also demonstrates the importance of a Research and Development (R&D) approach in producing proven educational products. Through the ADDIE (Analysis, Design, Development, Implementation, Evaluation) stages, the Geo game model was successfully systematically validated and implemented in a classroom context. This is in accordance with recommendations (Borg, 1989) and that educational products must pass expert validity tests and field tests to ensure their quality (Sugiyono, 2019).

Interpretation the increase in scores from the small to large scale (74.25 to 93.8) indicates a significant pedagogical improvement. Practically, this means that the more students participate, the greater the positive impact in the learning context. The very high increase in focus and cooperation (over 90 on the large scale) indicates that geo games not only improve physical skills but also students' socio-emotional aspects, which are crucial for building discipline, sportsmanship, and togetherness. However, this study has limitations, particularly in the availability of game equipment. Geo wood, the main equipment, is relatively difficult to obtain and requires quality materials to prevent damage. Therefore, further research is needed to develop alternative local materials that are more readily available but still safe to use. Furthermore, the long-term implementation of Geo games also needs to be examined to determine whether their impact on students' motor and social skills is consistent when implemented sustainably. Overall, the results of this study strengthen the literature stating that traditional games can be an effective learning medium in physical education. Geo games in particular offer a comprehensive learning model, integrating physical, social, and cultural aspects. The practical implications of this research are the need for schools to integrate traditional games into the physical education curriculum as an alternative to local culture-based learning. Teachers can adapt geo-games by adjusting the field size, number of players, and equipment materials to make them easier to implement. Furthermore, training for physical education teachers is needed to enable them to facilitate traditional games correctly, safely, and meaningfully. Thus, in addition to improving students' motor

skills, this model also contributes to the preservation of local culture, which is being eroded by modern technological developments.

#### 4. CONCLUSION

This study concludes that the development of a physical education learning model based on traditional Geo games has proven effective in improving elementary school students' basic movement skills, focus, and cooperation. Validation by experts showed a very high predicate (Aiken's  $V \geq 0.90$ ), and the implementation of Geo games resulted in significant improvements from small-scale to large-scale trials, with a statistically very strong difference in scores. The advantages of Geo games lie not only in the motoric aspects, but also in the integration of local social, emotional, and cultural values that are relevant to contextual learning needs. Therefore, Geo games are worthy of being an alternative for physical education learning that is fun, meaningful, and contributes to the preservation of local traditions. For teachers, it is recommended that Geo games be integrated into physical education lesson plans, used routinely in learning, and adapted to the conditions of school infrastructure. Teachers also need to innovate by utilizing local materials as substitutes for Geo equipment to make it easier to implement, while also encouraging collaboration and communication between students during play. In addition, teacher training on the implementation of traditional games is important so that activities are safe, effective, and support the achievement of physical education goals. Implications for future research include the need for longitudinal studies to assess the sustainability of the Geo game's impact, explore its influence on students' motivation and psychological development, and develop adaptations of the game in a digital context to suit the current generation. Research should also be expanded to various regions in Indonesia to determine the potential for Geo games to be implemented beyond their original cultural context, while also comparing them with other traditional games to strengthen local wisdom-based physical education literacy. Thus, Geo games not only enrich physical education learning strategies but also serve as a relevant character education tool in the modern.

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