

Development of the “Ayo Tumpuk” Traditional-Game-Inspired Learning Medium to Promote Fundamental Movement Skills in Phase C Elementary School Students

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Abstract. This study developed and evaluated the feasibility, practicality, and preliminary effectiveness of the “Ayo Tumpuk” game as a physical education learning medium for Phase C elementary school students. The study employed Research and Development using the ADDIE model. Participants were 33 Grade V students at SD Negeri Kapas, Kediri Regency. Data were collected through observation, interviews, expert-validation sheets, motor-skill assessments, and teacher and student questionnaires. Expert validation yielded 92.5% feasibility, learning implementation reached 94.0%, and user responses averaged 92.5%. The mean motor-related score increased from 72.1 at pretest to 88.5 at posttest. The findings indicate that the developed medium is feasible and practical and provides preliminary evidence of improved coordination, balance, and agility. Further controlled studies are required to establish effectiveness.

Keywords: traditional games; physical education; fundamental movement skills; ADDIE; elementary school

1 Introduction

Physical education is an integral component of elementary education because structured physical activity contributes to children’s physical, motor, social, emotional, and cognitive development. At elementary-school age, students require varied and enjoyable movement experiences that support the acquisition of fundamental movement skills and encourage active participation. Fundamental movement skills provide an important foundation for later motor learning and participation in physical activity [1]. Physical education can also contribute to the development of social skills when learning activities require interaction, cooperation, and shared responsibility [2].

Traditional and locally contextualized games offer one possible strategy for making physical education more engaging while maintaining meaningful movement experiences. Previous studies have reported that traditional games can support basic movement learning at elementary-school level [3], gross-motor development [4], social interaction and character development [5], and children’s motivation to move [6]. Nevertheless, the existing literature cited in this study mainly discusses established traditional games or traditional-game-based activities in general. It does not explain the development of a simple, school-adaptable learning medium that combines locomotor movement, object-control tasks, balance, agility, and cooperative play within a single structured activity for Phase C students.

To address this practical gap, the present study developed “Ayo Tumpuk” (Let’s Stack), a traditional-game-inspired physical education learning medium using simple materials available in the surrounding environment. The product was designed to involve coordinated movement, balance, agility, object manipulation, and teamwork. In this manuscript, “traditional-game-

inspired” is used deliberately because the available source material does not provide historical evidence that Ayo Tumpuk is an established traditional game. This terminology therefore distinguishes the developed instructional game from culturally documented traditional games.

The novelty of the study lies in the systematic adaptation of a simple stacking-and-ball activity into a structured physical education medium through the ADDIE development process, followed by expert feasibility assessment, classroom implementation, pretest-posttest motor assessment, and user-response evaluation. Accordingly, this study aimed to develop and evaluate the feasibility, practicality, and preliminary effectiveness of the Ayo Tumpuk learning medium for promoting fundamental movement-related skills among Grade V students in Phase C elementary physical education.

2 Methods

2.1 Research Design

This study employed Research and Development (R&D) using the ADDIE framework: Analysis, Design, Development, Implementation, and Evaluation [7]. The framework was selected because it provides a systematic sequence for identifying learning needs, designing a product, validating and revising the product, implementing it in the classroom, and evaluating its use. Quantitative descriptive analysis was used for feasibility, implementation, and user-response data, while pretest-posttest descriptive comparison was used to examine preliminary changes in student outcomes.

2.2 Participants and Setting

The field trial was conducted at SD Negeri Kapas, Kunjang District, Kediri Regency, East Java. Participants were 33 Grade V students (Phase C), comprising 15 boys and 18 girls. The school was selected purposively because it had an active physical education program and was open to the implementation of locally contextualized learning innovations.

2.3 ADDIE Development Procedure

During the Analysis stage, the researchers interviewed the physical education teacher and observed learning activities. The needs analysis indicated that lessons were dominated by common activities such as mini soccer and relay running, whereas locally contextualized games were rarely used. The Phase C physical education curriculum was also reviewed to align the product with learning objectives.

During the Design stage, the researchers specified the game rules, equipment, scoring procedures, and learning indicators. The intended motor-related indicators were coordination, balance, and agility, while teamwork was treated as a social-learning indicator rather than a fundamental movement skill. Research instruments included expert-validation sheets, an observation-based movement assessment, an implementation sheet, and teacher and student response questionnaires.

During the Development stage, a prototype of Ayo Tumpuk was prepared using simple materials, including modified balls and cans. Three validators representing movement/physical education, traditional-game or contextual-game expertise, and learning-media expertise assessed curriculum suitability, media design and safety, suitability for elementary-school students, and ease of implementation. Formative feedback from validation was used to refine the game before the field trial.

During the Implementation stage, the revised product was implemented with 33 Grade V students over four meetings, each lasting 2×35 minutes. The physical education teacher acted as facilitator. Data were collected on learning implementation, student movement performance, teamwork, and user responses. During Evaluation, formative evaluation was conducted throughout development, while summative evaluation compared pretest and posttest scores and summarized feasibility, implementation, and response data.

2.4 Instruments and Data Analysis

Expert feasibility was calculated as the obtained score divided by the maximum possible score and multiplied by 100%. The original study classified 81–100% as highly feasible, 61–80% as feasible, 41–60% as moderately feasible, and below 40% as not feasible. Implementation and user-response data were summarized descriptively as percentages. Pretest and posttest means were compared descriptively. Percentage change was recalculated using $((\text{posttest} - \text{pretest}) / \text{pretest}) \times 100$. Because the available dataset does not report an inferential paired test, the study does not use the term “statistically significant” and interprets the pretest-posttest results as preliminary evidence only.

3 Results

3.1 Expert Validation

The three expert validators rated the developed product positively. The overall feasibility score was 92.5%, placing the product in the highly feasible category. Media design and equipment safety received the highest score (93.5%).

Table 1. Expert feasibility assessment of the Ayo Tumpuk learning medium.

Aspect	Maximum score	Mean score	Percentage	Category
Alignment with Phase C physical education learning outcomes	20	18.3	91.5%	Highly feasible
Media design and equipment safety	20	18.7	93.5%	Highly feasible
Suitability for elementary-school students	20	18.6	93.0%	Highly feasible
Ease of implementation by students	20	18.4	92.0%	Highly feasible
Overall	80	73.9	92.5%	Highly feasible

3.2 Learning Implementation

The four-session field trial achieved an average implementation score of 94.0%. Students demonstrated high active involvement and cooperation, while the teacher reported that the game was relatively easy to implement using simple equipment.

Table 2. Implementation of learning using Ayo Tumpuk.

Indicator	Score (%)	Category
Understanding of game rules	91	Very good
Active student involvement	94	Very good
Cooperation	96	Very good
Overall implementation	95	Very good
Average	94.0	Very good

3.3 Pretest-Posttest Outcomes

Descriptive results showed higher posttest scores than pretest scores across all assessed dimensions. The overall mean increased from 72.1 to 88.5, corresponding to a 22.7% relative increase. Coordination increased by 25.3%, balance by 21.6%, agility by 18.0%, and teamwork by 26.6%. These values describe observed change and should not be interpreted as statistical significance because no inferential paired analysis was available in the source dataset.

Table 3. Pretest-posttest scores and recalculated percentage change.

Outcome	Pretest	Posttest	Change (%)
Movement coordination	70.3	88.1	25.3
Balance	73.2	89.0	21.6
Agility	74.5	87.9	18.0
Teamwork	70.4	89.1	26.6
Overall mean	72.1	88.5	22.7

3.4 Teacher and Student Responses

User responses were positive. Ninety-five percent of students described the game as enjoyable, 92% considered it safe and easy to play, 90% of the teacher response indicated relevance to Phase C physical education learning outcomes, and 93% indicated ease of implementation. The overall positive-response average was 92.5%.

Table 4. Teacher and student responses to Ayo Tumpuk.

Respondent	Indicator	Positive response	Category
Students	Enjoyable	95%	Very good
Students	Safe and easy to play	92%	Very good
Teacher	Relevant to Phase C learning outcomes	90%	Very good

Teacher	Easy to implement	93%	Very good
Overall	Average	92.5%	Very good

4 Discussion

The findings of this study provide an overall picture of the development, implementation, and initial outcomes of Ayo Tumpuk as a game-based learning medium for elementary-school physical education. The results can be understood through three interconnected aspects, namely product feasibility, students' movement outcomes, and the practicality and responses observed during implementation. These aspects are presented below to provide a structured interpretation of the study findings while maintaining a distinction between feasibility and evidence of learning effectiveness.

The study produced three main findings. First, expert validation indicated high feasibility (92.5%), suggesting that the product was considered appropriate in terms of curriculum alignment, media design and safety, elementary-school suitability, and ease of implementation. This result supports the use of a systematic development process in which instructional needs, product design, validation, implementation, and evaluation are treated as connected stages [7]. The feasibility result should nevertheless be interpreted as expert judgment of the developed product rather than direct evidence of learning effectiveness.

Second, students obtained higher posttest scores in coordination, balance, and agility after four sessions. The movement structure of Ayo Tumpuk may provide repeated opportunities for object manipulation, rapid repositioning, postural adjustment, and coordinated eye-hand-foot actions. These movement demands are consistent with the broader importance of fundamental movement skills as a basis for subsequent motor learning [1]. The finding is also directionally consistent with previous work showing that traditional-game-based learning can support basic movement development in elementary-school settings [3] and gross-motor development in children [4].

Third, implementation and user-response scores were high. Game-based physical education may increase participation because it combines movement challenges with simple rules, social interaction, and immediate task goals. Previous studies cited in the manuscript similarly emphasize the potential of traditional games to strengthen social interaction and character-related learning [5] and to increase motivation for movement [6]. In the present study, however, teamwork should be interpreted separately from motor outcomes because it represents a social-learning dimension rather than a fundamental movement skill.

The findings provide preliminary support for Ayo Tumpuk as a feasible and practical learning medium, but they do not establish causal effectiveness. The study involved only one school, 33 students, four meetings, and no comparison group. The available source material also does not provide detailed psychometric evidence for the movement assessment or an inferential paired statistical test. Consequently, score improvements may also reflect practice, familiarity, teacher feedback, or other classroom factors. Future research should use validated motor-skill instruments, report inter-rater reliability where observation is used, include a comparison group, extend the intervention period, and examine whether improvements are retained over time.

Taken together, these findings indicate that Ayo Tumpuk has potential to function as a practical learning medium that integrates physical activity with game-based learning experiences. At the

same time, the interpretation of the results should remain proportional to the scope and design of the study. The present evidence is most appropriately viewed as an initial basis for further development and investigation rather than as definitive evidence of the effectiveness of Ayo Tumpuk in improving students' motor skills. This distinction strengthens the interpretation of the study by recognizing both the contribution of the findings and the methodological limitations that should be addressed in subsequent research.

5 Conclusion

The Ayo Tumpuk traditional-game-inspired learning medium was developed through the ADDIE framework for Grade V students in Phase C elementary physical education. Expert validation yielded a feasibility score of 92.5%, learning implementation averaged 94.0%, and teacher and student responses averaged 92.5%. Descriptive pretest-posttest results showed increases in movement coordination, balance, and agility, while teamwork also improved as a social-learning outcome. These findings indicate that the product is feasible and practical and provides preliminary evidence of positive learning outcomes. Because the study used a single-group field trial without inferential testing, further controlled research with larger samples and validated assessment instruments is required before strong claims of effectiveness can be made. Overall, the findings suggest that Ayo Tumpuk can serve as a feasible and practical learning medium for integrating traditional-game-inspired activities into elementary physical education, particularly by providing opportunities for students to practice coordination, balance, agility, and teamwork through active and engaging movement experiences. The high feasibility, implementation, and response scores further indicate that the product can be accepted by teachers and students and implemented within the learning context. However, these findings should be interpreted as preliminary evidence rather than definitive proof of effectiveness, given the limited research design and assessment conditions. Therefore, the study contributes an initial foundation for the use and further development of Ayo Tumpuk, while future research should strengthen the evidence through larger samples, comparison groups, validated assessment instruments, and inferential statistical analysis.

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