



Vonis Game Development to Improve Physical Education Learning Skills at Elementary School

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Abstract

The background of the study departs from the finding that learning net games tends to be difficult for students to understand due to its complex techniques and the lack of learning media that are appropriate to the characteristics of elementary school students. This study aims to develop the Vonis game as a physical education learning medium to improve students' learning skills in net games material. This study uses the Research and Development method with the ADDIE model which includes the stages of analysis, design, development, implementation, and evaluation. The results show that the Vonis game is considered very feasible based on validation by material experts, media experts, and design experts. Staged trials involving 4 students in individual tests, 8 students in small group tests, and 16 students in large group tests showed an increase in student understanding, motivation, and engagement in learning. The analysis shows that the Vonis game is able to simplify the net game pattern through a simple field design, easy rally rules, and a safe plastic ball so that it is appropriate to the abilities of elementary school students. The study concludes that the Vonis game is effective as an alternative learning medium in improving the quality of physical education learning, although this study still has limitations related to the number of subjects and the scope of the trial.

How to Cite

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INTRODUCTION

Physical education learning in elementary schools plays a crucial role in developing students' motor, cognitive, affective, and social skills as part of character building and physical fitness. Physical education, as emphasized, directly contributes to students' motor development and health (Candra et al., 2023). However, in practice, learning activities are often monotonous, limited to routine activities, and lack innovative learning models capable of optimally stimulating basic movement skills. This situation demonstrates the need for teacher creativity in designing effective learning programs (Aprilyanti et al., 2025). This situation results in many students being less motivated to actively participate in PE lessons because the activities provided do not fully align with children's developmental needs and do not provide meaningful learning experiences, including due to limited supporting learning facilities and infrastructure (Mahendra et al., 2021). Furthermore, limited creativity in the use of media and games also makes the learning process less engaging, resulting in students having difficulty understanding movement concepts and basic game techniques. A good learning model should enable students to gain structured and meaningful learning experiences (Metzler, 2017).

In elementary schools, including elementary school Sembungharjo 01, Semarang city, learning net games such as volleyball or tennis often requires coordination skills and basic techniques that students have not yet fully mastered. Meanwhile, developmentally appropriate motor stimulation is a crucial factor in the learning process (Surmaryanti et al., 2024). The relatively complex nature of these games causes some students to experience difficulties in practicing basic movements such as serving, passing, and ball control, which is also related to the importance of learning planning that can accommodate students' motor skills (Ristiyanto et al., 2024). This situation is exacerbated by the differences in motor skills of each student, which are quite diverse, while the learning media used tend not to be modified to suit the conditions of elementary school students, even though the use of appropriate games can improve social interaction and student learning readiness (Hutomo & Kurniawan, 2025). These limitations have an impact on low participation, lack of student self-confidence when carrying out game activities, and less than optimal learning outcomes in net game material, so that teachers need learning innovations that are arranged systematically and

based on needs using a development approach such as ADDIE (Tegeh & Kirna, 2013).

As a scientific basis, research on game development in physical education learning has shown significant contributions to improving student skills. (Anwar, 2013) found that a modified tennis game was able to improve students' forehand stroke learning outcomes through simpler and more structured movement activities. Furthermore, (Kamaludin et al., 2020) proved that the traditional sintren plate-breaking game effectively improves children's gross motor skills when applied to elementary school physical education learning. Another finding was demonstrated by (Firmantomo, 2025) who developed the firedorr games and concluded that game innovation had a positive impact on increasing student learning activities and participation during physical education learning.

Although various studies have developed games as learning media in physical education, most of these studies focus on traditional games or modifications of certain games that are not specifically designed to address students' difficulties in net games in elementary schools. There are not many studies that systematically examine the development of modified volleyball and tennis-based games for learning needs in schools with diverse student characteristics such as elementary school Sembungharjo 01, Semarang city. Based on this research gap, this study aims to develop the Vonis game as an alternative learning media that is more adaptive, simple, and appropriate to students' abilities in practicing basic net game techniques. This research is expected to provide benefits in the form of the availability of innovative game models that can improve physical education learning skills, strengthen student motivation, and help teachers provide more interesting and effective learning in elementary schools.

METHOD

This study uses the Research and Development (R&D) method which aims to produce a learning product in the form of a Vonis game adapted to improve elementary school students' physical education learning skills. This method was chosen because it is able to facilitate a systematic product development process starting from identifying needs to testing feasibility in the field. The R&D approach allows researchers to create practical solutions to learning problems found in schools. The development model used in this study refers to the ADDIE framework which

consists of five stages, namely Analysis, Design, Development, Implementation, and Evaluation, which sequentially refine the developed learning product.

Analysis phase was conducted to identify the learning needs and challenges experienced by students in learning netball at elementary school Sembungharjo 01 Semarang City. Researchers conducted observations of the learning process and interviews with physical education teachers to determine students' basic abilities, technical obstacles, and limited resources. Furthermore, researchers also identified student characteristics related to motor skills, learning motivation, and understanding of basic techniques such as serving and passing. The results of this analysis were used as the basis for determining the form of Vonis that was relevant and appropriate to the learning needs.

Design stage is the stage of designing the Vonis game concept, which includes the preparation of game rules, field design, game equipment specifications, and the sequence of learning activities. Researchers prepared an initial design in the form of a 21-point rally rule, the use of a specific size plastic ball, a modified net height, and a game interaction pattern that emphasizes coordination and ball control. In addition, researchers developed a guidebook design, a simple demonstration video, and measurement instruments such as expert validation sheets, game implementation observation sheets, and a Likert-scale-based student response questionnaire. These design components were structured according to pedagogical principles relevant to physical education learning.

Development stage is the stage of realizing the design into a Vonis game product that is ready to be tested. At this stage, researchers created a game prototype and validated it with material experts, media experts, and learning design experts. The validation instrument used a five-category Likert scale-based assessment sheet (1 = strongly disagree/not feasible to 5 = strongly agree/very feasible). The use of the Likert scale refers to the concept of educational instrument assessment proposed by Riduwan (2012) who emphasized that the Likert scale is effective for measuring perceptions, feasibility, and responses to a development product. Product feasibility criteria were calculated using a percentage formula and interpreted based on category intervals such as: 0–25% (not feasible), 26–50% (less feasible), 51–75% (feasible), and 76–100% (very feasible) as classified by Arikunto (2013) in the evaluation of learning products. The product was then revised

based on expert input until it met the feasible or very feasible category.

Implementation phase involved three trial phases to assess the applicability and student response to the Vonis game. Individual trials were conducted with four students to assess initial understanding, rule clarity, and ease of use. A small group trial involving eight students was then conducted to assess gameplay, player interaction, and technical aspects of the field. A large group trial was then conducted with 16 students in a real-world learning situation to measure the game's effectiveness in improving learning skills, student engagement, and the ability to practice basic net play techniques. The entire implementation process was observed using an implementation observation sheet and a student response questionnaire.

Evaluation phase was conducted to assess the success of the Vonis game, both in terms of its feasibility and effectiveness in learning. Formative evaluation was conducted throughout the development and implementation process using expert feedback and student trials. Summative evaluation was conducted after all implementation stages were completed, referring to the concept of learning program evaluation according to Branch (2009), which explains that a final evaluation is necessary to ensure the overall effectiveness of the product. Student response assessments and expert validation results were analyzed using a descriptive percentage approach with category interpretation as recommended by (Sugiono., 2019) to determine the level of quality of educational products. Results are considered to meet standards if all aspects obtain a minimum score of "feasible" ($\geq 51\%$) and ideally reach "very feasible" ($\geq 76\%$).

Overall, the ADDIE R&D method provides a systematic and directed framework for developing the Vonis game. The sequential stages, from needs analysis, design, development, implementation, and evaluation, ensure that the resulting product is not only technically and pedagogically feasible but also suitable for improving the learning skills of elementary school students. This approach ensures that the Vonis game has a strong development foundation, positive student response, and the potential for widespread application in physical education learning.

RESULTS AND DISCUSSION

The results of this study are presented based on the stages of ADDIE model development, including needs analysis, initial product de-

sign, product development, trial implementation, and the results of the evaluation of the feasibility of the Vonis game as a physical education learning medium at elementary school Sembungharjo 01, Semarang City.

The analysis phase showed that net play learning at Sembungharjo 01 Elementary School, Semarang City, was not running optimally because students had difficulty mastering basic techniques such as serving, passing, and ball control. Initial Observations showed that some students were able to perform basic movements, but more than half still had difficulty directing the ball accurately into the opponent's playing area. The Physical Education teacher also stated that there were no modified game media suitable for the characteristics of elementary school students, so the learning felt monotonous and less interesting. These findings indicate the need for alternative games that are simpler, more adaptive, and easier to understand to improve basic net skills.

How to Play the Vonis Game

1. The game begins with a serve from one of the teams.
2. Players throw or hit the ball over the net into the opponent's area.
3. The opposing team must return the ball with a maximum of three touches.
4. The ball must not fall in their own court.
5. If the ball falls in the opponent's area or the opponent fails to return the ball, the attacking team gets one point.
6. The game continues until a predetermined score is reached 21 points.

Rules of the Vonis game

1. Each team is allowed a maximum of three touches before returning the ball.
2. Players must not touch the net during the game.
3. The ball must pass over the net to be considered valid.
4. If the ball goes out of bounds, the point is awarded to the opposing team.
5. The serve must be performed from behind the service line.
6. Players must play fairly and avoid any physical violations or fouls.

Based on the analysis, the researchers designed the Vonis game as a modification of volleyball and tennis. The playing field measures 13.40 meters x 6.10 meters, similar to a tennis court or badminton court, if available, with a net height of 1.7 meters. **Figure 1** below shows a complete field diagram with boundary lines and

simplified area divisions to suit the abilities of elementary school students.

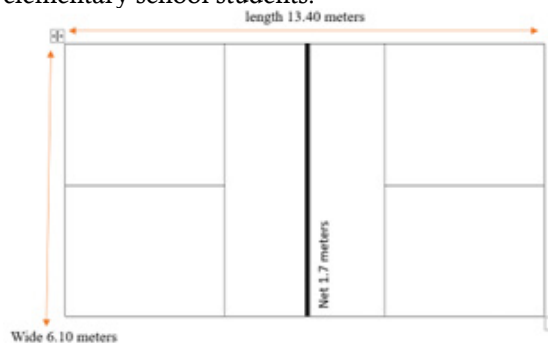


Figure 1. Vonis Field Scheme

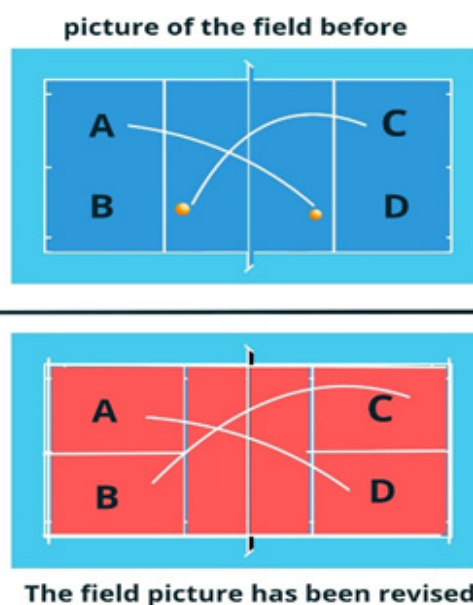


Figure 2. field before and after revision

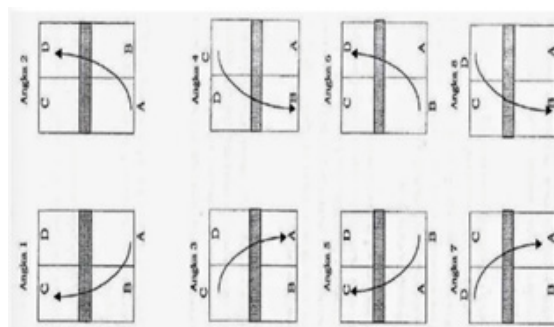


Figure 3. Ball Flow Pattern and Direction of Play

Figure 3 shows the ball flow pattern and direction of play, providing a visual understanding of the basic strategy in Vonis. This illustration includes various shot directions to help students understand the trajectory of the ball. This initial design includes the rules of the 21-point rally, the

division of the playing area (A–D), and the basic procedure for the underhand serve as a technique most appropriate for elementary school students. The game uses a medium-sized plastic ball that is lightweight, safe, and easy to control, as shown in **Figure 4**.



Figure 4. Vonis Game Ball

During the development phase, researchers developed a Vonis game prototype complete with a guidebook, game instructions, and supporting illustrations. The prototype was then validated by three experts: a physical education material expert, a learning media expert, and a learning design expert. The expert validation results are as **Table 1**.

Table 1. Expert Validation Results

Expert Type	Percentage	Category
Subject Matter Expert	92%	Very Worthy
Learning Media Expert	90%	Very Worthy
Learning Design Expert	91%	Very Worthy

Expert input included adjusting the wording of several instructions, improving the details of the ball's direction illustration in **Figure 2**, and re-emphasizing the boundaries of the playing area to make them easier for students to understand. Revisions were made before entering the implementation phase. The implementation stage was carried out in stages through three trial phases to ensure that the Vonis game could be applied effectively in physical education learning.

Individual Trial (4 students)

This pilot test aims to assess students' basic understanding of the game rules, ball handling, and clarity of instructions. Findings from this stage indicate several areas for improvement:

- The students did not understand the field boundaries well, so the researcher enlarged the visualization of the lines on the printed media and added line markings using field

tape to make them clearer.

- The service instructions were too quick to grasp so a step-by-step demonstration was added, including an example of a correct underhand serve.
- There were difficulties in controlling the ball so an additional ball control practice session was carried out before the game started.

Once these revisions are implemented, the game can proceed to the next stage, namely small group trials.

Small Group Trial (8 students)

This trial focused on the effectiveness of gameplay, positional shifts, and player interactions. Observations revealed several aspects that needed adjustment before the game could be implemented in larger groups:

- The distance between the players was too close so the researcher widened the distance between the positions by adjusting the location of areas A–D according to the pattern in **Figure 2**.
- The net height needs to be adjusted so that the net is lowered by about 5–7 cm from the initial height of 1.7 m to make it easier for students to return the ball.
- The direction of the ball's movement was poorly understood, so the researchers added a clearer arrow illustration to the guidebook.
- The rally duration was too long for beginners so the rally rules were simplified with a maximum of 3 touches per team in the initial practice sessions.

After these technical adjustments were made, the game was ready to be tested on a large group.

Large Group Trial (16 students)

At this stage, the Vonis game was implemented in a real-life learning situation. Students played according to the rules revised in the previous stage. The trial results showed that students were able to follow the game flow well, their enthusiasm for learning increased, and their basic net play skills, such as serving, ball control, and positional shifting, were significantly improved compared to the previous lesson. Observations also showed that social interaction among students improved as the game pattern required cooperation.

The final evaluation was conducted through student responses and observations of the game's implementation. Summative evaluation was conducted using percentage interpretation criteria based on Sugiyono (2019). The three

main aspects assessed were understanding, ease of use, and interest.

Table 2. Final Evaluation Results

Aspect	Percentage	Qualification
Understanding	91.20%	Very Worthy
Convenience	89.75%	Very Worthy
Interest	88.40%	Very Worthy

The evaluation results show that the Vonis game was very well received by students and can be used as an alternative learning medium that can significantly improve understanding of basic net play techniques.

Research findings indicate that the development of the Vonis game can improve students' understanding and basic skills in learning net games. This improvement is evident in the clarity of simpler game patterns, the use of a lightweight ball, and rally rules that are easy for elementary school students to understand. The game model, which combines volleyball and tennis principles, provides an engaging learning experience while also improving eye-hand coordination. This aligns with (Ibrahim, 2025) findings, which state that the Vonis game effectively improves students' learning activities and motor skills because its design is adapted to the characteristics of elementary school children. Furthermore, the game concept, which emphasizes simplicity of technique and visualization of the game flow, has been shown to facilitate students' understanding of net games.

The improvement in student learning outcomes in this study is also consistent with various studies of modified games in physical education. (Anwar, 2013) found that modified tennis games can improve forehand hitting skills through a learning model tailored to students' motor skills. The same finding is reflected in this study, particularly when the rally rules are simplified and the visualization of the ball's direction is clarified, allowing students to more easily return the ball to the correct area. In fact, the application of the movement pattern in Figure 2 has been shown to accelerate students' understanding of ball direction, similar to (Putri, 2017) study, which showed that the TGfU approach in tennis games improves students' decision-making through visual understanding and repeated practice.

The results of this study also support the findings of experts regarding the effectiveness of games as a medium for learning Physical Education. (Firmantomo, 2025) proved that Firedorr

Games can increase student interaction and engagement during learning due to the competitive yet easy-to-play nature of the game. A similar condition was seen in the Vonis game when tested in large groups, where students showed higher enthusiasm compared to conventional learning. Furthermore, the Vonis game, which emphasizes cooperation and positional shifts, is also in line with the perspective of (Mas'odi, 2024) who stated that game-based learning designs can improve students' social skills through collaborative activities. Thus, the Vonis game not only improves motor skills, but also social interaction and students' self-confidence.

When compared to other game development research, the results of this study are consistent with the findings of (Kamaludin et al., 2020), who confirmed that the Sintren plate-breaking game can improve children's gross motor skills through simple and enjoyable play activities. Similarly, the Vonis game approach successfully improved students' motor skills after technical adjustments such as adjusting the standing distance and lowering the net to suit the child's abilities. Furthermore, the application of a game-based learning pattern in this study also supports the findings of (Prasetyo et al., 2025), who stated that game-based learning has been proven effective in developing motor skills in Physical Education education. This study also aligns with the results of (Nurharsono et al., 2023) who found that the application of the TPSR-based game model increased students' personal responsibility and social interaction during learning. Furthermore, the Vonis game, as a simple thematic game, also supports the findings of (Adi et al., 2022) and (Aryananda et al., 2022), who emphasized that thematic games and modified traditional games can improve students' learning outcomes and physical fitness. In fact, the role of the "fun" aspect in the Vonis game is consistent with research by (Aqhla, 2022) and (Alifia et al., 2024) which shows that the play method and TGfU model can increase motivation and physical fitness through varied and enjoyable activities.

Although this study yielded positive results, there are several limitations that warrant consideration. First, the trial was conducted in only one school with a limited number of subjects, so generalization of the results should be approached with caution. Second, the evaluation of the Vonis game only assessed aspects of comprehension, ease of use, and interest; it did not include quantitative measurements of motor skills such as power, agility, or coordination using standardized instruments. Third, this study did

not compare the effectiveness of the Vonis game with other learning models, so its relative effectiveness cannot be comprehensively concluded. Fourth, varying school infrastructure conditions can impact the game's implementation, so additional adaptations may be necessary. Therefore, further research should involve more subjects, conduct more comprehensive motor measurements, and compare the Vonis game with other learning models to obtain a more robust picture of its effectiveness.

CONCLUSION

The results of the study indicate that the Vonis game developed through the ADDIE model is proven to be feasible and effective as a physical education learning medium at Elementary school sembungharjo 01 Semarang City. Validation by material, media, and design experts shows a very feasible category, while tiered trials from individuals, small groups, to large groups show an increase in student understanding, participation, and motivation in learning net games. The simplicity of the field design, easy-to-understand game rules, and the use of safe plastic balls make the Vonis game suitable for the characteristics of elementary school students. Thus, the Vonis game can be an alternative learning model that can enrich teacher strategies in improving learning skills and the quality of physical education learning.

The implications of this research indicate that the integration of modified games such as Vonis can have a positive impact on the effectiveness of physical education learning, because this game provides a fun, safe learning experience and is oriented towards active student participation. Teachers can use Vonis as a flexible and easily adapted learning medium for various basic skills related to net games. Furthermore, the ADDIE-based development approach provides a systematic overview that can be used as a guideline for teachers or other researchers in designing educational games in elementary schools. This shows that simple game innovations can be a solution to improve the quality of learning, overcome limited resources, and support teachers' pedagogical competence in creating engaging learning.

This study has several limitations, including the limited number of subjects and the fact that it was conducted in only one school, making the results difficult to generalize. The evaluation instrument also focused more on assessing aspects of understanding, ease of use, and interest, thus not including quantitative measurements

of motor skills. Furthermore, the diversity of school infrastructure can influence the suitability of Vonis game implementation, requiring additional adaptations. Based on these limitations, it is recommended that future research involve more schools, conduct effectiveness tests using standard motor skills instruments, and compare Vonis with other learning models to comprehensively strengthen its effectiveness. Furthermore, the development of additional media such as video tutorials and digital modules can improve the quality of Vonis game implementation in various schools

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