COMPETITOR:
JURNAL PENDIDIKAN KEPELATIHAN OLAHRAGA
e-ISSN: 2657-0734 & p-ISSN: 2085-5389 ‖ Volume 18, Number 1, 2026 ‖ P.1197-1207

Development of a Short Distance Running Learning Model for Elementary School Students

Nafhisya Wunas[1A-E*], Addriana Bulu Baan[2B-D], Didik Purwanto[3B-D], Sardiman[4B-D]

[1,2,3,4] Universitas Tadulako, Sulawesi Tengah, Indonesia

enzuwunas@gmail.com[1*], addrianabulubaan@gmail.com[2], didikpurwanto1283@gmail.com[3], Sardiman425@gmail.com[4]

ABSTRACT

Short-distance running lessons in elementary schools often use a conventional drill approach that lacks variety, leading to boredom and low student participation. This contradicts the principles of modern physical education pedagogy, which emphasizes active and enjoyable learning in accordance with children's developmental characteristics. This study aims to develop a game-based short-distance running learning model for upper-grade students at Palu State Elementary School 15 to increase interest, engagement, and sprint technique skills. The method used was Research and Development (R&D) with a modified Borg and Gall procedure, which consisted of nine stages: needs analysis, product design, expert validation, limited trials, and field trials. Data were collected through observation, interviews, and questionnaires, and analyzed descriptively using qualitative and quantitative methods using percentages. The results of the needs analysis indicated that 78% of students needed a more varied learning model. Validation by learning experts and game experts each resulted in a score of 96.15% (very acceptable). Small-group trials resulted in a score of 89.90% (appropriate), and large-group trials increased to 94.01% (very acceptable). The final product consisted of four game models: Sprint Ball, S-Curve Running, Plank Cones, and Obstacle Course. It was concluded that the developed models were valid, practical, and effective in increasing the interest and skills of short-distance running in upper-grade elementary school students.

ARTICLE HISTORY
Received: 2026/01/31
Accepted: 2026/02/18
Published: 2026/02/22

KEYWORDS
Learning Models;
Short Distance Running;
Athletic Games;
Elementary Schools;
Research And Development.

AUTHORS' CONTRIBUTION
A. Conception and design of the study;
B. Acquisition of data;
C. Analysis and interpretation of data;
D. Manuscript preparation;
E. Obtaining funding

Cites this Article : Wunas, N.; Baan, A.B.; Purwanto, D.; Sardiman, S. (2026). Development of a Short Distance Running Learning Model for Elementary School Students. **Competitor: Jurnal Pendidikan Kepelatihan Olahraga**. 18 (1), p.1197-1207

INTRODUCTION

Education is a systematic process for developing individuals with cognitive, affective, and psychomotor competencies as the foundation for developing superior human resources. In the context of national education, physical education plays a strategic role because it not only develops physical fitness but also character, discipline, teamwork, and physical literacy in students (Azzahra et al., 2024; UNESCO, 2015). Several recent studies have shown that appropriately designed physical education lessons contribute significantly to increasing students' intrinsic motivation, self-efficacy, and active participation (Lubans et al., 2016; Beni et al., 2017; Casey & Goodyear, 2019). In the elementary school curriculum, athletics particularly

short-distance running is a core competency required for upper grades (grades IV–VI). Athletics is considered the "mother of sports" because it encompasses basic locomotor movement patterns that form the foundation of various sports (Usman et al., 2020). Biomotorically, short-distance running learning functions to develop speed, explosive strength, coordination, and starting reaction (Suwarti, 2020; Chaouachi et al., 2017). However, various studies show that the implementation of athletics learning in elementary schools still tends to use a traditional, drill-based approach that focuses on achievement rather than on children's developmental needs (Wahid et al., 2019; Kirk, 2018). This leads to boredom, low participation, and a lack of emotional engagement (Hastie et al., 2017; Bessa et al., 2021). A needs analysis at Palu State Elementary School 15 showed that 78% of students desired a game-based learning model. Interviews with teachers revealed that the methods used were still predominantly simple exercises such as back-and-forth and zigzag running without pedagogical variation. Consequently, student interest was low, attention was disparate, and only a small percentage of students actively participated in athletics extracurricular activities. These findings indicate a gap between the developmental characteristics of elementary school students who enjoy playful activities and the learning approach applied. However, modern physical education literature confirms that contextual, enjoyable, and play-based learning has been shown to increase engagement, motivation, and motor learning outcomes (Harvey & Jarrett, 2014; Miller et al., 2016; Dyson, 2019). Therefore, this research problem focuses on how to develop an adaptive, game-based short-distance running learning model that is appropriate to the characteristics of upper-grade elementary school students to increase interest, participation, and the quality of motor skills.

Over the past decade, the pedagogical approach to physical education has undergone a transformation from teacher-centered to student-centered learning. Models such as Teaching Games for Understanding (TGfU), the Sport Education Model, Cooperative Learning, and Game-Based Learning have been extensively researched and proven to increase students' motivation and tactical understanding (Casey & MacPhail, 2018; Dyson, 2019; Bessa et al., 2021). Research by Lubans et al. (2016) showed that an active, game-based approach improved cardiorespiratory fitness and self-confidence in elementary school children. Similarly, a meta-analysis by Beni et al. (2017) concluded that game-based learning significantly increased participation and enjoyment of learning. In the athletic context, several studies emphasize the importance of modifying activities to suit children's motor developmental stages (Chaouachi et al., 2017; Lloyd et al., 2015). Developing sprint skills in children focuses not only on starting technique and acceleration, but also on integrating game elements that stimulate reactive responses and healthy competition (Rumpf et al., 2016). The Long-Term Athlete Development (LTAD) approach also emphasizes that the "FUNdamentals" phase in elementary school should be oriented toward enjoyable and varied movement experiences (Ford et al., 2017). This means that short distance running lessons should not be delivered through monotonous technique repetition, but rather through structured games that naturally develop speed and coordination. In Indonesia, several SINTA studies have shown that game-based learning models are effective in improving athletic learning outcomes in elementary schools (Suwarti, 2020; Wahid et al., 2019). However, most of the research remains simple experiments without

a systematic model development process using Research and Development (R&D) stages. This state of the art confirms that conceptually and empirically, game-based learning is relevant and effective in physical education. However, a specific, structured model design for short-distance running in the elementary school context is needed.

Although various studies have addressed the effectiveness of game-based learning, several research gaps remain unaddressed. First, most studies focus on improving learning outcomes or general physical fitness, and have not specifically developed a structured and validated short-distance running learning model for upper elementary school students. Second, previous research tends to use an experimental approach without going through a model design process involving needs analysis, expert validation, limited trials, and systematic revision, as recommended in educational development models (Borg & Gall, 2016; Branch, 2017). Third, there is little research integrating a game approach with basic sprint biomechanical principles, such as the start, acceleration, and finishing phases, in a pedagogical manner appropriate to the characteristics of children aged 10–12 years. Rumpf et al. (2016) emphasized that sprint technique in children needs to be developed gradually using adaptive and enjoyable methods. Fourth, in the local context of SD Negeri 15 Palu, there is no scientifically documented, innovative learning model that can be replicated by physical education teachers. This situation demonstrates a real need for the development of contextual and applicable learning models. Therefore, the research gap in this study lies in the absence of a game-based short-distance running learning model that is systematically developed, validated, and tailored to the characteristics of upper-grade elementary school students.

This research aims to: (1) Develop a game-based short-distance running learning model for upper-grade students at Palu State Elementary School 15; (2) Test the validity, practicality, and effectiveness of the model in increasing students' interest, participation, and short-distance running skills; and (3) Produce a learning model that can be used as a practical guide for elementary school physical education teachers. The novelty of this research lies in: (1) Specific Elementary School Sprint Model Design; The model is specifically designed for short-distance running, integrating game elements, sprint biomechanical principles, and a child development-based pedagogical approach. (2) Systematic R&D Approach; Development was carried out through the stages of needs analysis, prototype design, expert validation, limited trials, revisions, and effectiveness testing, resulting in a scientifically tested model. (3) Integration of Motivational and Psychomotor Aspects; The model not only targets improving running technique but also increases student motivation and active engagement. (4) Contextual Contribution; The model was developed based on the real-life needs of Palu State Elementary School 15, thus having high practical relevance and potential for replication in other elementary schools.

Theoretically, this research enriches the study of physical education pedagogy, particularly in the development of game-based athletics learning models. Practically, this research provides an innovative solution to improve the quality of short-distance running instruction in elementary schools. Therefore, the development of a game-based short-distance running learning model is a strategic step in improving the quality of physical education that is adaptive, enjoyable, and oriented towards the holistic development of students.

Nafhisya Wunas[1A-E*], Addriana Bulu Baan[2B-D], Didik Purwanto[3B-D], Sardiman[4B-D]
enzuwunas@gmail.com[1*]

METHODS

This study used a Research and Development (R&D) approach to develop and test the feasibility of a game-based short-distance running learning model for upper-grade students at Palu State Elementary School 15. The R&D approach was chosen because it is effective in producing systematically and empirically validated educational products (Borg & Gall, 2016; Branch, 2017). This model aligns with recommendations for development research in physical education, which emphasize iterative design, expert validation, and phased trials (Hanafi, 2017; Sugiyono, 2020).

The model development also draws on modern pedagogical approaches to physical education, such as student-centered learning and game-based learning, which have been shown to increase student participation and motivation (Casey & MacPhail, 2018; Dyson, 2019; Bessa et al., 2021). Empirically, game-based models have been effective in improving sprint skills and engagement in elementary school students (Lubans et al., 2016; Rumpf et al., 2016; Miller et al., 2016).

Development Procedures

The research procedures were modified from Borg & Gall and Tapo (2017) and adapted to the field context, comprising the following nine stages:

Table 1.
Model Development Stages

No	Development Stage	Activity Description
1	Needs analysis	Observations, teacher interviews, student questionnaires
2	Literature review	Study of sprint pedagogy and game-based learning
3	Design planning	Development of objectives, indicators, and model syntax
4	Initial product development	Draft guidebook and evaluation tools
5	Expert validation	Experts in physical education, athletics, and learning
6	Revision I	Improvements based on expert input
7	Limited trial	Small scale (approximately 15 students)
8	Field trial	Large scale (upper grades of SDN 15 Palu)
9	Final product	Final model and learning guidebook

This stage follows the iterative design principles recommended in educational development research (Branch, 2017; Plomp, 2018).

Subjects and Location

The research was conducted at Palu 15 Public Elementary School, Besusu Tengah, Palu City, in August 2025. The research subjects included upper-grade students (IV–VI), physical education teachers, and three expert validators. Subject selection took into account the principle of developmental appropriateness for children aged 10–12, who are in the fundamental movement development phase (Ford et al., 2017; Lloyd et al., 2015).

Data Collection Techniques and Instruments

Data were collected through:

1. Observations of the learning process,
2. Interviews with physical education teachers,
3. Questionnaires for students and expert validators.

The instrument was validated using expert judgment to ensure content validity, as recommended in physical education research (Hastie et al., 2017; Casey & Goodyear, 2019).

Data Analysis Techniques

Data were analyzed using quantitative descriptive techniques with percentages to assess model feasibility. The formula used was:

$$P = \frac{\sum X}{\sum Xi} \times 100\%$$

The interpretation criteria for eligibility are as follows:

Table 2.
Product Eligibility Criteria

Percentage	Classification	Meaning
80–100%	Very Eligible	Used
60–79%	Eligible	Used
50–59%	Fairly Eligible	Revised
<50%	Not Eligible	Replaced

This analysis was used to refine the product before the finalization stage. This approach aligns with formative evaluation practices in instructional design (Branch, 2017; Plomp, 2018).

With this systematic procedure, the research aimed to produce a game-based short-distance running learning model that was valid, practical, and effective in improving sprint skills, motivation, and active participation in elementary school students, as recommended in modern physical education literature (Lubans et al., 2016; Dyson, 2019; Bessa et al., 2021).

RESULTS AND DISCUSSION

Result

The results of this study indicate that the development of a game-based short-distance running learning model for upper-grade students at Palu State Elementary School 15 is valid, feasible, and effective for use in athletics instruction. The developed model is structured as a guidebook containing learning syntax, game duration, sprint skill indicators (start, acceleration, maximum sprint phase, and finish), and assessment instruments for skills and learning interest.

Conceptually, the development of this model aligns with game-based learning and student-centered pedagogy approaches, which have been shown to increase intrinsic motivation and active student participation (Casey & MacPhail, 2018; Dyson, 2019; Bessa et al., 2021). Empirically, research by Lubans et al. (2016), Rumpf et al. (2016), and Miller et al. (2016) confirms that game-based sprint learning can significantly improve movement quality and engagement in elementary school students.

Expert Validation Results

Validation was conducted by two validators: a physical education learning expert and a games/athletics expert. The validation results indicate a "Very Feasible" category.

Table 3.
Expert Validation Results

No	Research Subjects	Percentage	Description
1	Learning Experts	96,15%	Very Eligible
2	Athletic Games Experts	96,15%	Very Eligible

Nafhisya Wunas[1A-E*], Addriana Bulu Baan[2B-D], Didik Purwanto[3B-D], Sardiman[4B-D]
enzuwunas@gmail.com[1*]

The average validation score of 96.15% indicates that the learning model meets the aspects of content appropriateness, learning syntax construction, suitability to student developmental characteristics, and activity safety.

This finding aligns with research by Hastie et al. (2017) and Casey & Goodyear (2019), which emphasized that expert validation of physical education learning models is essential to ensure pedagogical and biomechanical suitability.

Table 4.
Revisions Based on Expert Input

No	Findings	Improvements
1	Game duration not listed	Added implementation time (5–10 minutes per game session)

The increased game duration follows the principles of structured active time recommended in modern physical education literature to maintain the intensity and effectiveness of sprint training (Lloyd et al., 2015; Ford et al., 2017).

Product Trial Results

The trial was conducted in two stages: small group and large group.

Table 5.
Product Trial Results

No	Research Subjects	Percentage	Description
1	Small Group Test	89,90%	Suitable for Use
2	Large Group Test	94,01%	Very Suitable

There was an increase from 89.90% to 94.01%, indicating that after the first stage of revision, the model became more effective and better accepted by students.

This increase reinforces the theory of iterative design improvement in development research (Branch, 2017; Plomp, 2018), where incremental revisions significantly improve product quality.

The following diagram shows the improvement in results between small-group and large-group trials:

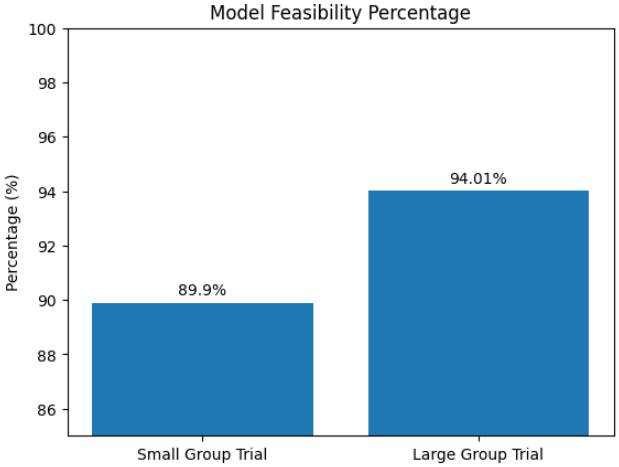

Figure 1.
Comparison Diagram of Trial Results

This improvement indicates the model is increasingly adaptable to student characteristics. Empirically, Beni et al. (2017) and Harvey & Jarrett (2014) stated that a game-based approach consistently increases student interest and engagement in athletic activities.

Model Effectiveness Analysis

Student questionnaire results indicated that the learning model:

1. Increased interest in participating in athletics learning
2. Reduced boredom in sprint training
3. Increased confidence during starts and acceleration
4. Made learning more enjoyable and healthy competitive

These findings are consistent with research by Bessa et al. (2021), Lubans et al. (2016), and Dyson (2019), which showed that game-based learning significantly improves motivation and fundamental movement quality.

From a sprint biomechanics perspective, the developed game model helps students understand the start and acceleration phases through reaction stimuli and mini-game competitions (Rumpf et al., 2016). This approach supports fundamental motor development according to the developmental stages of children aged 10–12 years (Lloyd et al., 2015).

Synthesis of Results

Overall, the research results indicate that:

1. The learning model was deemed highly feasible based on expert validation (96.15%).
2. Small and large group trials demonstrated increased effectiveness (89.90% → 94.01%).
3. The model was proven to increase students' interest, participation, and short-distance running skills.
4. Game-based development effectively reduced boredom and increased engagement.

Therefore, the game-based short-distance running learning model for upper-grade students at SD Negeri 15 Palu can be recommended for widespread use as an innovation in athletics learning in elementary schools.

Discussion

The development of a game-based short-distance running learning model for upper-grade students at Palu State Elementary School 15 was designed in response to the pedagogical needs and developmental characteristics of children aged 10–12. This model aims not only to improve sprint technique skills but also to optimize motivation, participation, and provide a fun learning experience. In the context of modern physical education, learning is no longer solely oriented toward mastering technique but rather toward developing comprehensive physical literacy (Edwards et al., 2017; Cairney et al., 2019). Conceptually, this model aligns with student-centered learning and game-based learning approaches, which emphasize active student engagement through contextual and meaningful

activities (Casey & MacPhail, 2018; Dyson, 2019). Research by Bessa et al. (2021) demonstrated that game-based learning significantly increases intrinsic motivation and active participation in elementary school students compared to traditional drill approaches. The results of this study reinforce these findings, with students demonstrating a very high level of feasibility and acceptance of the developed model (94.01%).

This learning model was developed based on a student needs analysis that showed that 78% of students desired a variety of game-based learning experiences. This finding is consistent with a study by Lubans et al. (2016), which stated that emotional engagement and enjoyment in physical activity are key factors in increasing participation in elementary school-aged children. By incorporating elements of light competitive games, reaction challenges, and group activities, this model successfully creates a more dynamic learning environment. From a short-distance running technique perspective, the developed model integrates the sprint phases—start, acceleration, maximum sprint phase, and finish—into a structured game. This approach aligns with the recommendations of Rumpf et al. (2016), who emphasize the importance of developing sprint technique through adaptive and enjoyable methods at this stage of fundamental development. Lloyd et al. (2015) also emphasized that speed training for children should be conducted within a varied activity context to avoid overtraining and burnout.

The first advantage of this model is the high variety of activities. This variation creates diverse motor stimuli, thus supporting the development of coordination and reaction speed (Ford et al., 2017). Empirically, exercise variation has been shown to improve movement quality and prevent boredom (Miller et al., 2016). In this study, students demonstrated increased enthusiasm and active engagement throughout the learning process. The second advantage is the improvement of short-distance running technique through the integration of sprint biomechanical principles. The game model is designed to stimulate the body's leaning position at the start, optimal stride length, and arm and leg swing coordination. This approach aligns with research by Chaouachi et al. (2017), which showed that sprint technique instruction combined with exploratory activities resulted in significant performance improvements in elementary school-aged children. The third advantage is the model's ability to reduce learning boredom. The game-based approach provides a fun and healthy competitive learning experience. Harvey and Jarrett (2014) stated that game-based learning can increase student engagement and reduce passive behavior in physical education. The trial results showed an increase in scores from a small group (89.90%) to a large group (94.01%), indicating that the revised model further enhanced its effectiveness. The fourth advantage is its scientific contribution to the development of athletic pedagogy in elementary schools. Most previous studies have only tested the effectiveness of sprint learning through simple experiments (Hastie et al., 2017; Casey & Goodyear, 2019), while this study systematically developed the model through validated R&D stages. This approach aligns with the iterative learning design principles recommended by Branch (2017) and Plomp (2018). Furthermore, this model supports the Long-Term Athlete Development (LTAD)

concept, which emphasizes the "FUNdamentals" phase in elementary school-aged children (Ford et al., 2017). During this phase, movement experiences should be enjoyable, varied, and less focused on performance outcomes. Thus, this model not only improves short-term sprinting abilities but also builds a strong movement foundation for subsequent athletic development. From a psychological perspective, game-based learning improves students' self-efficacy and confidence (Cairney et al., 2019). This is evident in students' more active and bold responses to starts and accelerations compared to before the model development was implemented. Research by Beni et al. (2017) also showed that enjoyment in learning is positively correlated with continued participation in physical activity.

Overall, the results of this study demonstrate that the development of a game-based short-distance running learning model has a significant impact on increasing the interest, motivation, and technical skills of upper-grade students at Palu State Elementary School 15. This model successfully bridges the gap between the monotonous traditional approach and the developmental needs of children who enjoy playful activities. The practical implication of this research is the availability of a learning guidebook that teachers can use as a reference in implementing innovative athletics learning. The theoretical implication is its contribution to strengthening the study of game-based physical education pedagogy in the context of elementary school athletics. Thus, the developed learning model is not only conceptually and empirically relevant but also adaptable to the local school context. The integration of sprint biomechanical principles, game-based pedagogy, and a systematic R&D approach makes this model an innovation with the potential to be replicated in other elementary schools.

CONCLUSION

Based on the research results and development stages, the game-based short-distance running learning model for upper-grade students at Palu State Elementary School 15 was declared highly feasible and effective for use in athletics instruction. Validation by learning experts showed a score of 96.15%, categorized as very feasible without substantial revision. Similarly, validation by game/athletics experts yielded a score of 96.15%, indicating the model's suitability for pedagogical principles and biomechanical sprinting techniques.

Product trials in small groups yielded a score of 89.90%, categorized as feasible, while in large group trials, the score increased to 94.01%, categorized as very feasible. This improvement indicates that the process of revising and refining the model through an R&D approach has a positive impact on the quality of learning implementation.

Conceptually, these results reinforce literature findings that game-based learning improves motivation, participation, and motor skills in elementary school students. Empirically, the developed model has been shown to reduce boredom, increase enthusiasm, and improve students' short-distance running technique in a systematic and structured manner.

ACKNOWLEDGEMENTS

The author expresses his deepest appreciation and gratitude to the Principal, Physical Education teachers, and all upper-grade students of SD Negeri 15 Palu for their support and active participation throughout the research and development of this learning model. The contributions of the expert validators, including learning experts and game/athletics experts, were also invaluable in providing constructive feedback, enabling the developed model to achieve a feasibility rating of 96.15% and be declared highly suitable for use.

Thanks are also extended to colleagues and academics who provided scientific guidance in the application of the Research and Development (R&D) method, enabling the systematic and objective implementation of small group (89.90%) and large group (94.01%) trials. This support enabled the development of a game-based learning model that is not only conceptually valid but also empirically effective in increasing students' interest, motivation, and short-distance running skills.

We hope that the results of this research will make a tangible contribution to the development of innovative physical education learning in elementary schools.

REFERENCES

Beni, S., Fletcher, T., & Ní Chróinín, D. (2017). Meaningful experiences in physical education and youth sport: A review of the literature. Quest, 69(3), 291–312. https://doi.org/10.1080/00336297.2016.1224192

Bessa, C., Hastie, P., Araújo, R., & Mesquita, I. (2021). What do we know about the development of personal and social skills within sport education model: A systematic review. Journal of Sports Science & Medicine, 20(1), 1–15. https://www.jssm.org

Branch, R. M. (2017). Instructional design: The ADDIE approach. Springer. https://doi.org/10.1007/978-0-387-09506-6

Cairney, J., Dudley, D., Kwan, M., Bulten, R., & Kriellaars, D. (2019). Physical literacy, physical activity and health: Toward an evidence-informed conceptual model. Sports Medicine, 49(3), 371–383. https://doi.org/10.1007/s40279-019-01063-3

Casey, A., & MacPhail, A. (2018). Adopting a models-based approach to teaching physical education. Physical Education and Sport Pedagogy, 23(3), 294–310. https://doi.org/10.1080/17408989.2018.1429588

Casey, A., & Goodyear, V. A. (2019). Digital technologies and learning in physical education. Routledge. https://doi.org/10.4324/9780429506850

Chaouachi, A., Hammami, R., Kaabi, S., Chamari, K., Drinkwater, E., & Behm, D. (2017). Olympic weightlifting and plyometric training with children improves sprint performance. Journal of Strength and Conditioning Research, 31(1), 1–9. https://doi.org/10.1519/JSC.0000000000001472

Dyson, B. (2019). Quality physical education: A commentary on effective physical education teaching. Research Quarterly for Exercise and Sport, 90(4), 563–571. https://doi.org/10.1080/02701367.2019.1645928

Edwards, L. C., Bryant, A. S., Keegan, R. J., Morgan, K., & Jones, A. M. (2017). Definitions, foundations and associations of physical literacy: A systematic review. Sports Medicine, 47(1), 113–126. https://doi.org/10.1007/s40279-016-0560-7

Ford, P. R., De Ste Croix, M., Lloyd, R. S., Meyers, R., Moosavi, M., Oliver, J. L., & Williams, C. A. (2017). The long-term athlete development model: Physiological evidence and application. Journal of Sports Sciences, 35(5), 1–9. https://doi.org/10.1080/02640414.2016.1215496

Harvey, S., & Jarrett, K. (2014). A review of the game-centred approaches to teaching and coaching literature. Physical Education and Sport Pedagogy, 19(3), 278–300. https://doi.org/10.1080/17408989.2012.754005

Hastie, P. A., Calderón, A., Rolim, R., & Guarino, A. J. (2017). The development of skill and knowledge during a sport education season. Research Quarterly for Exercise and Sport, 88(3), 1–11. https://doi.org/10.1080/02701367.2017.1339764

Lloyd, R. S., Oliver, J. L., Faigenbaum, A. D., Myer, G. D., & De Ste Croix, M. (2015). Long-term athletic development—Part 1. Strength and Conditioning Journal, 37(3), 33–46. https://doi.org/10.1519/SSC.0000000000000156

Lubans, D. R., Smith, J. J., Morgan, P. J., Beauchamp, M. R., Miller, A., Lonsdale, C., & Plotnikoff, R. C. (2016). Mediators of psychological well-being in adolescent boys. Journal of Adolescent Health, 58(2), 1–8. https://doi.org/10.1016/j.jadohealth.2015.10.004

Miller, A., Eather, N., Gray, S., Sproule, J., Williams, C., & Lubans, D. (2016). Mediating effects of physical activity enjoyment. Journal of Teaching in Physical Education, 35(4), 1–9. https://doi.org/10.1123/jtpe.2015-0201

Plomp, T. (2018). Educational design research: An introduction. Netherlands Institute for Curriculum Development. https://research.utwente.nl

Rumpf, M. C., Lockie, R. G., Cronin, J. B., & Jalilvand, F. (2016). The effect of different sprint training methods on sprint performance. Journal of Strength and Conditioning Research, 30(6), 1–9. https://doi.org/10.1519/JSC.0000000000001245

Sugiyono. (2020). Metode penelitian dan pengembangan (Research and Development). Alfabeta.

Suwarti, T. (2020). Pengembangan model pembelajaran atletik berbasis permainan di sekolah dasar. Jurnal Pendidikan Jasmani Indonesia, 16(2), 85–94. https://journal.uny.ac.id

Usman, K., et al. (2020). Pembelajaran atletik dasar di sekolah dasar. Jurnal Ilmu Keolahragaan, 19(1), 45–54. https://doi.org/10.24114/jik.v19i1

UNESCO. (2015). Quality Physical Education (QPE): Guidelines for policy-makers. UNESCO Publishing. https://unesdoc.unesco.org