RESEARCH PAPER

GAME-BASED SERVICE AND COORDINATION TRAINING MODEL FOR BEGINNER SEPAK TAKRAW ATHLETES (AGED 11–12 YEARS)

[1*]Wa Ode Nastia, [2]Nofi Marlina Siregar, [3]Hernawan

[1*]Physical Education, Universitas Negeri Jakarta, Indonesia waodenastia88@gmail.com,
[2]Physical Education, Universitas Negeri Jakarta, Indonesia nofims@unj.ac.id,
[3]Physical Education, Universitas Negeri Jakarta, Indonesia hernawan@unj.ac.id

Abstract

This study aimed to develop and validate a game-based service and coordination training model for beginner sepak takraw athletes aged 11–12 years. The research was motivated by the limited availability of structured training models that integrate service technique development with coordination exercises for young athletes. Many beginner players experience difficulties in performing accurate and consistent service techniques due to insufficient coordination training and the dominance of conventional drill-based training methods. This study employed a Research and Development (R&D) approach adapted from the development model of Borg and Gall. The research procedures included needs analysis, product design, expert validation, small-group trial, product revision, large-group field testing, and final product refinement. The participants consisted of 55 beginner sepak takraw athletes aged 11–12 years from three sepak takraw clubs in Southeast Sulawesi, Indonesia. Data were collected using questionnaires, observation checklists, expert validation sheets, service skill tests, and coordination tests. The effectiveness of the training model was evaluated through pre-test and post-test measurements. The results of the needs analysis indicated that more than 70% of athletes experienced difficulties in performing accurate service techniques and lacked sufficient coordination training. Expert validation results showed that the developed training model achieved a very good feasibility level, with an average score of 4.56 out of 5, indicating that the model was appropriate and practical for implementation. The results of the field testing demonstrated a significant improvement in athletes' performance, with the mean score of service skills increasing from 62.14 in the pre-test to 78.36 in the post-test, while coordination scores improved from 60.27 to 76.45. In conclusion, the game-based service and coordination training model proved to be valid, practical, and effective in improving both service skills and coordination abilities of beginner sepak takraw athletes. The model provides an innovative and engaging training approach that can support the development of fundamental skills in youth sepak takraw training programs.

Keywords: *Game-Based Service, Coordination Training Model, Beginner Sepak Takraw Athletes*

How to cite this article: Nastia WO, Siregar NM, Hernawan. Game-Based Service And Coordination Training Model For Beginner Sepak Takraw Athletes (Aged 11–12 Years). Int J Drug Deliv Technol. 2026;16(34s):252-260. DOI: 10.25258/ijddt.16.34s.32

1. BACKGROUND OF THE STUDY

Sepak takraw is one of the traditional sports in Southeast Asia that has developed into a competitive sport at national and international levels. The game requires players to demonstrate a combination of technical skills, physical abilities, and tactical understanding. Among the fundamental techniques in sepak takraw, the service (tekong serve) plays a crucial role because it initiates the rally and often determines the early advantage in a match. A powerful and accurate serve can directly score points or create pressure on the opponent's defense. Therefore, the mastery of service techniques must be introduced and trained effectively from an early stage of athlete development (Aziz & Teh, 2018). However, for beginner athletes, especially those aged 11–12 years, mastering the service technique is often challenging due to the complexity of movement coordination required between the lower limbs, body balance, and timing of ball contact.

In the development of young athletes, training programs must consider the characteristics of children's physical and psychological development. According to Bompa and Buzzichelli (2019), early-stage training should emphasize fundamental motor skills, coordination, and enjoyment of the training process rather than focusing solely on performance outcomes. Children in the age group of 11–12 years are in a critical phase of motor skill development where coordination abilities can be improved significantly through structured and varied training activities. Coordination itself is a key component in sports performance because it allows athletes to control complex movements efficiently and accurately (Schmidt & Lee, 2019). In sepak takraw, coordination between visual perception, body balance, and foot movement is essential for performing effective service techniques.

Despite the importance of coordination and technical mastery, training practices in many youth sepak takraw programs still rely heavily on conventional drill-based methods. These methods often involve repetitive technical exercises that may not fully engage young athletes or stimulate their motor learning processes. Research in sport pedagogy suggests that monotonous training methods can reduce children's motivation and participation in sports activities (Wein, 2017). In contrast, game-based training approaches have been widely recommended for youth sports because they integrate skill development with enjoyable and

*Author for Correspondence: waodenastia88@gmail.com,

meaningful activities. Through games, athletes can develop technical skills while simultaneously improving decision-making, coordination, and tactical awareness (Light, 2013).

Game-based learning approaches have been implemented successfully in various sports training programs. Studies indicate that integrating games into training sessions can improve both skill acquisition and athlete motivation (Harvey & Jarrett, 2014). In youth sports development, the use of modified games allows athletes to experience realistic game situations while practicing fundamental techniques. For example, research by Ford et al. (2010) shows that training environments that combine structured practice and game-like activities contribute significantly to the development of technical and perceptual skills in young athletes. This approach is particularly relevant for sports that require complex coordination, such as sepak takraw.

Sepak takraw itself demands a high level of coordination, agility, balance, and flexibility. According to Jawis et al. (2005), successful sepak takraw performance depends on the integration of physical fitness components and technical skills, particularly in executing the serve, spike, and block. Among these techniques, the serve requires precise coordination between the supporting leg, striking leg, trunk movement, and visual focus on the ball. Beginner athletes often struggle to achieve consistent and accurate serves due to insufficient coordination training. Therefore, training programs that specifically integrate coordination development with service technique practice are necessary for improving young athletes' performance.

In addition, the age group of 11–12 years represents a crucial stage in long-term athlete development. According to the Long-Term Athlete Development (LTAD) model, this stage falls within the "Learn to Train" phase, where athletes should be introduced to structured skill training while maintaining enjoyment and engagement in sports activities (Balyi, Way, & Higgs, 2013). Training models at this stage should emphasize fundamental movement skills, coordination, and sport-specific techniques through creative and enjoyable methods. Consequently, integrating game-based activities into service training may provide an effective strategy to enhance both coordination and technical skill development among beginner sepak takraw athletes.

In the context of Indonesia, sepak takraw has been widely developed through school programs, sports clubs, and regional training centers. However, training models specifically designed for beginner athletes are still limited, particularly those that combine service technique training with coordination development through game-based activities. Many coaches continue to rely on traditional approaches without structured models tailored to the developmental characteristics of young athletes. As a result, beginner athletes may experience difficulties in mastering basic techniques, including the serve, which may affect their long-term performance development.

Based on preliminary observations in several sepak takraw training clubs, it was found that many beginner athletes have not yet mastered the fundamental service technique effectively. Training sessions often focus on repetitive drills without integrating coordination exercises or playful learning approaches. This condition indicates the need for an innovative training model that is suitable for young athletes and capable of improving both coordination and service skills simultaneously.

Therefore, this study was conducted in three sepak takraw clubs in Southeast Sulawesi, involving 55 beginner athletes aged 11–12 years as research participants. These athletes represent the early development stage of competitive sepak takraw training and provide an appropriate sample for investigating the effectiveness of a structured training model. By focusing on this specific age group and training environment, the study aims to develop a training model that is practical, engaging, and developmentally appropriate for young sepak takraw athletes.

The purpose of this research is to develop and validate a game-based service and coordination training model designed specifically for beginner sepak takraw athletes aged 11–12 years. The study seeks to produce a systematic training model that can improve athletes' service skills and coordination through structured game-based activities. The novelty of this research lies in the integration of service technique training and coordination development within a game-based training framework, which has not been widely developed in sepak takraw training programs, particularly for beginner athletes. In addition, this research provides a practical training model that can be implemented by coaches in youth sepak takraw development programs to enhance both technical proficiency and athlete engagement in the training process.

2. LITERATURE REVIEW

2.1 Sepak Takraw Skill Development in Youth Athletes

Sepak takraw is a sport that requires a combination of technical skills, physical abilities, and tactical understanding. The game involves complex body movements such as jumping, kicking, balancing, and controlling the ball using different parts of the body except the hands and arms. According to Jawis, Singh, Singh, and Yassin (2005), sepak takraw players must possess high levels of agility, flexibility, coordination, balance, and explosive power in order to perform technical skills effectively. Among these skills, service is considered one of the most important techniques because it determines the beginning of each rally and often provides a strategic advantage for the serving team.

For beginner athletes, mastering basic techniques is an essential part of the early training process. Young athletes must first develop fundamental motor skills before progressing toward more complex technical movements. Bompa and Buzzichelli (2019) state that the early stages of athletic development should focus on building basic movement skills, coordination, and technical foundations. Without a solid foundation of

these elements, athletes may face difficulties in mastering sport-specific techniques later in their development.

In the context of youth sepak takraw training, coaches must design training programs that are appropriate to the physical and psychological characteristics of young athletes. Children aged 11–12 years are in a developmental stage where motor coordination improves rapidly. Therefore, training activities at this stage should emphasize the development of coordination, balance, and control of body movements. A well-structured training model can help young athletes learn technical skills more effectively and prepare them for higher levels of competition.

2.2 Service Technique in Sepak Takraw

The service technique in sepak takraw, often referred to as the tekong serve, is one of the most decisive skills in the game. The serve is performed by the tekong player who strikes the ball using the foot while the ball is tossed by a teammate. According to Aziz and Teh (2018), a successful sepak takraw serve requires a combination of timing, body coordination, balance, and leg power. The accuracy and speed of the serve can influence the opponent's ability to receive the ball and organize an attack.

Executing an effective serve involves several coordinated movements, including body positioning, supporting leg stability, kicking motion, and visual focus on the ball. These elements must be synchronized to produce a powerful and accurate serve. Schmidt and Lee (2019) explain that complex sport skills require the integration of perceptual processes and motor coordination, allowing athletes to execute movements with precision and efficiency.

For beginner athletes, the complexity of these coordinated movements can present challenges in learning the service technique. Many young athletes struggle with timing the kick, maintaining balance, and directing the ball accurately. As a result, service errors often occur during training and competition. Therefore, effective training methods are required to help beginner athletes develop the coordination and technical skills needed for successful service execution.

Previous studies in sports training indicate that skill acquisition can be enhanced through progressive training models that integrate technical drills with motor coordination exercises. By combining these components, athletes can improve their ability to control body movements and execute sport-specific techniques more consistently.

2.3 Coordination in Sports Performance

Coordination is a fundamental component of physical fitness that plays an important role in sports performance. It refers to the ability to synchronize different body movements efficiently to achieve a specific motor task. According to Magill and Anderson (2017), coordination allows individuals to organize complex movement patterns involving multiple joints and muscles. In sports activities, coordination contributes to movement accuracy, balance, and timing.

In sepak takraw, coordination is particularly important because players must perform dynamic movements such as kicking, jumping, and controlling the ball simultaneously. These movements require precise interaction between visual perception, body balance, and limb movement. Without adequate coordination, athletes may experience difficulties in controlling the ball and executing technical skills effectively.

Research in motor learning also emphasizes the importance of coordination training during childhood and early adolescence. Gallahue, Ozmun, and Goodway (2012) explain that the development of motor coordination occurs rapidly during the late childhood stage, making it an ideal period for introducing structured training programs aimed at improving motor control and skill performance.

Furthermore, coordination training has been shown to improve athletes' ability to perform complex sport techniques. Exercises that involve balance, rhythm, spatial awareness, and reaction time can significantly enhance movement efficiency. For young athletes, coordination training should be presented in engaging and varied forms to maintain motivation and participation during practice sessions.

2.4 Game-Based Training Approach in Youth Sports

In recent years, game-based training approaches have gained increasing attention in sports education and coaching. This approach emphasizes learning through modified games that simulate real game situations while maintaining a fun and engaging environment. According to Light (2013), game-based learning encourages athletes to actively participate in the learning process, allowing them to develop technical skills, decision-making abilities, and tactical awareness simultaneously.

Traditional training methods often focus on repetitive drills that isolate specific techniques. While such methods can be effective for refining technical movements, they may not always provide meaningful learning experiences for young athletes. Harvey and Jarrett (2014) argue that game-based training offers a more holistic approach to skill development by integrating physical, cognitive, and social aspects of learning.

Game-based training also increases athlete motivation and enjoyment during practice. Young athletes tend to respond more positively to activities that involve competition, creativity, and interaction with teammates. By incorporating games into training sessions, coaches can create a learning environment that encourages active participation and continuous skill development.

Research conducted by Ford, Yates, and Williams (2010) found that athletes who engaged in game-based practice environments demonstrated better technical development and perceptual skills compared to those who trained using traditional methods alone. This finding supports the idea that game-based approaches can enhance the effectiveness of youth sports training programs.

2.5 Game-Based Training for Skill and Coordination Development

Game-based training has also been shown to be effective in improving both technical skills and coordination abilities. Through modified games, athletes are required to perform various movements such as running, balancing, kicking, and reacting to dynamic situations. These activities stimulate the development of motor coordination while simultaneously reinforcing sport-specific skills.

According to Wein (2017), training activities designed in the form of games provide opportunities for athletes to explore movement patterns and develop creative solutions during play. This process supports the development of motor learning and adaptability in sports performance. In youth training programs, the use of games can facilitate the integration of technical, physical, and cognitive skills in a natural and enjoyable way.

For beginner sepak takraw athletes, game-based training may provide an effective strategy for improving service skills and coordination. By incorporating game elements into training exercises, athletes can practice service techniques in situations that resemble real game conditions while simultaneously enhancing their coordination abilities. Such training models can help athletes develop confidence and consistency in performing technical skills.

2.6 Conceptual Basis for Developing a Game-Based Service and Coordination Training Model

Based on the theoretical perspectives and previous studies discussed above, it can be concluded that effective training for beginner sepak takraw athletes should integrate several key components, including technical skill development, coordination training, and enjoyable learning environments. The service technique requires precise coordination and motor control, which can be improved through structured training activities that engage athletes actively in the learning process.

Game-based training approaches provide an appropriate framework for achieving these objectives. By combining elements of play, competition, and skill practice, coaches can create training programs that enhance both technical proficiency and athlete motivation. Furthermore, incorporating coordination exercises into game-based activities allows athletes to develop movement efficiency while practicing sport-specific techniques.

Therefore, the development of a game-based service and coordination training model for beginner sepak takraw athletes is theoretically supported by principles of motor learning, youth athlete development, and sport pedagogy. Such a model is expected to contribute to more effective training practices in youth sepak takraw programs and support the long-term development of athletes.

3. RESEARCH METHODOLOGY

This study employed a Research and Development (R&D) approach to develop and validate a game-based service and coordination training model for beginner sepak takraw athletes aged 11–12 years. The R&D method was chosen because the study aimed not only to analyze existing training practices but also to produce a practical and effective training model that can be implemented by coaches in youth sepak takraw development programs. The research procedure adopted the development stages of Borg and Gall (2003), which were simplified into several key steps: needs analysis, product design, expert validation, small-group trial, product revision, large-group field testing, and final product refinement.

The participants of this study consisted of 55 beginner sepak takraw athletes aged 11–12 years from three sepak takraw clubs in Southeast Sulawesi, Indonesia. Participants were selected using purposive sampling, with criteria including athletes within the specified age range, categorized as beginner players, and actively participating in regular training activities. In addition, sports coaching experts, sepak takraw coaches, and physical education specialists were involved in the expert validation stage to evaluate the feasibility, clarity, and practicality of the developed training model.

Data were collected using several instruments, including a needs analysis questionnaire to identify existing training practices and challenges in learning service techniques, expert validation sheets to assess the feasibility of the developed model, and an observation checklist to monitor the implementation of the training activities. In addition, a service skill test was used to measure athletes' accuracy and consistency in performing sepak takraw service techniques, while a coordination test was used to assess athletes' motor coordination related to sepak takraw movements.

The research procedures began with a needs analysis stage, which involved observations, interviews, and questionnaires to identify problems in current training practices. Based on these findings, the researcher developed a game-based service and coordination training model designed to improve athletes' technical skills and coordination abilities. The initial model was then evaluated through expert validation, and the feedback obtained was used to revise the product. After revision, the model was tested through a small-group trial to examine its practicality and implementation. Further improvements were made before conducting large-group field testing involving 55 athletes from three sepak takraw clubs. The final stage involved refining the training model based on the results of the field testing to produce the final version of the game-based service and coordination training model.

The collected data were analyzed using descriptive and inferential statistical techniques. Descriptive analysis was used to summarize the results of the needs analysis, expert validation, and observations. Meanwhile, the effectiveness of the developed training model in improving service skills and coordination abilities was evaluated through pre-test and post-test comparisons. Qualitative data obtained from expert feedback and

observations were analyzed descriptively to support the refinement of the final training model.

4. FINDINGS/RESULTS

This section presents the findings of the study based on the stages of the Research and Development (R&D) procedure, including needs analysis, expert validation, product trials, and effectiveness testing of the game-based service and coordination training model for beginner sepak takraw athletes aged 11–12 years.

4.1 Needs Analysis Results

The needs analysis was conducted through observations and questionnaires distributed to coaches and athletes from three sepak takraw clubs in Southeast Sulawesi involving 55 athletes. The analysis aimed to identify current training practices and challenges faced by beginner athletes in learning service techniques. The results indicate that most athletes experienced difficulties in performing accurate and consistent service techniques, mainly due to limited coordination training and the dominance of conventional drill-based methods.

Table 1. Results of Needs Analysis (n = 55)

Indicator	Number of Athletes	Percentage
Difficulty performing accurate service	41	74.5%
Difficulty maintaining balance during service	38	69.1%
Limited coordination training in regular sessions	44	80.0%
Training dominated by repetitive drills	40	72.7%
Athletes prefer game-based training activities	47	85.5%

These findings indicate a strong need for a structured and engaging training model that integrates coordination development with service technique training through game-based activities.

4.2 Development of the Game-Based Training Model

Based on the needs analysis and relevant theoretical frameworks, a game-based service and coordination training model was developed. The model consisted of 10 structured training activities, each designed to integrate: service technique practice, coordination exercises and modified game situations

The training activities were arranged progressively from basic coordination exercises to more complex game-based service drills. Each activity included objectives, equipment requirements, implementation procedures, and evaluation indicators to facilitate practical use by coaches.

4.3 Expert Validation Results

The developed training model was evaluated by three experts, consisting of a sports coaching expert, a sepak takraw coach, and a physical education specialist. The evaluation focused on the relevance, clarity, practicality, and suitability of the training model for beginner athletes.

Table 2. Expert Validation Results

Evaluation Aspect	Mean Score (1–5)	Category
Relevance to training objectives	4.63	Very Good
Clarity of training instructions	4.47	Very Good
Suitability for athlete age	4.58	Very Good
Practicality for coaches	4.52	Very Good
Safety of training activities	4.60	Very Good
Overall Mean Score	4.56	Very Good

The results indicate that the developed training model is valid and appropriate for implementation, with minor revisions suggested by experts regarding training instructions and equipment arrangement.

4.4 Small-Group Trial Results

The revised model was tested on a small group of 15 athletes to evaluate the practicality and implementation of the training activities. Observations during the trial showed: athletes demonstrated high participation and enthusiasm, training activities were easy to understand and coordination exercises integrated well with service practice. The average implementation score from observation results was 4.42 out of 5, indicating that the training model was practical and feasible for field implementation.

4.5 Effectiveness Test (Large-Group Field Testing)

After revisions, the training model was implemented in a large-group trial involving 55 athletes from three sepak takraw clubs. The effectiveness of the training model

was evaluated using pre-test and post-test measurements of service skill and coordination ability.

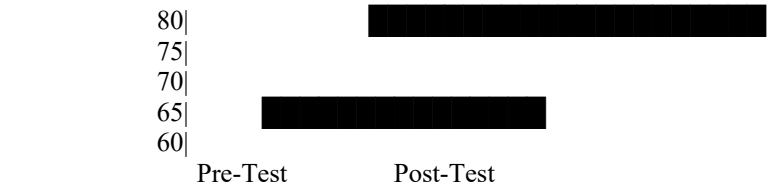
Service Skill Improvement

Table 3. Pre-Test and Post-Test Results of Service Skill

Test	Mean Score	Standard Deviation
Pre-Test	62.14	7.83
Post-Test	78.36	6.95
Improvement	+16.22	

The results show a significant improvement in service performance after the implementation of the game-based training model.

Visualization of Service Skill Improvement



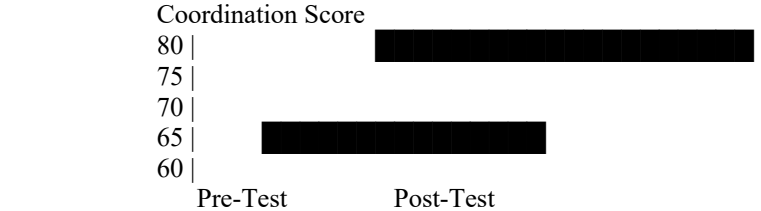
Coordination Ability Improvement

Table 4. Pre-Test and Post-Test Results of Coordination Ability

Test	Mean Score	Standard Deviation
Pre-Test	60.27	8.11
Post-Test	76.45	7.26
Improvement	+16.18	

The results indicate that the training model also contributed to a substantial improvement in athletes' coordination ability.

Visualization of Coordination Improvement



The findings of this study demonstrate that the game-based service and coordination training model developed through the R&D process is: 1) Relevant and needed by beginner sepak takraw athletes and coaches, 2) Validated by experts with a very good feasibility score (4.56), 3) Practical to implement during training sessions and 4) Effective in improving athletes' service skills and coordination abilities.

The implementation of the model resulted in significant improvements in both service performance and coordination ability among the 55 athletes aged 11–12 years. These results indicate that integrating game-based activities with technical and coordination training provides an effective approach for developing fundamental skills in beginner sepak takraw athletes.

5. DISCUSSION

The findings of this study demonstrate that the development of a game-based service and coordination training model can effectively improve the service skills and coordination abilities of beginner sepak takraw athletes aged 11–12 years. The results obtained from the needs analysis, expert validation, and field testing provide empirical evidence that integrating technical training with game-based coordination activities is an effective approach for youth athlete development.

The needs analysis revealed that a large proportion of athletes experienced difficulties in performing accurate and consistent service techniques. More than seventy percent of the participants reported problems related to service accuracy and balance, while eighty percent indicated that coordination training was rarely integrated into their regular training sessions. These findings indicate that conventional training methods, which are dominated by repetitive drills, may not sufficiently support the development of coordination and technical skills among beginner athletes. This situation aligns with previous studies suggesting that traditional drill-based approaches often limit athlete engagement and may not fully support motor learning processes in young athletes.

The development of the training model in this study addressed these limitations by integrating service technique practice with coordination development through game-based activities. The model consisted of structured training activities designed to gradually develop athletes' coordination, balance, and service execution. The expert validation results indicated that the training model achieved a very good feasibility level,

with an overall score of 4.56 out of 5. This finding suggests that the developed model is appropriate in terms of training objectives, clarity of instructions, safety, and suitability for the developmental characteristics of athletes aged 11–12 years.

The results of the small-group trial also indicated that the training model was practical and easy to implement during training sessions. Athletes showed high levels of participation and enthusiasm during the game-based activities. This outcome is consistent with the argument that game-based learning approaches can increase motivation and engagement among young athletes. Training activities designed in the form of games create a more enjoyable learning environment, allowing athletes to practice technical skills in dynamic and meaningful situations.

The effectiveness test conducted during the large-group field trial demonstrated a significant improvement in both service skill performance and coordination ability among the 55 participating athletes. The mean score of service skills increased from 62.14 in the pre-test to 78.36 in the post-test, while the coordination score improved from 60.27 to 76.45. These results indicate that the training model successfully enhanced athletes' ability to perform the service technique more accurately and consistently. The improvement in coordination ability also suggests that the integration of coordination exercises within game-based activities contributes to the development of motor control required for executing complex sport movements.

From the perspective of motor learning theory, these findings support the idea that skill acquisition occurs more effectively when athletes practice movements in varied and meaningful contexts. Coordination-based game activities allow athletes to experience multiple movement patterns and adapt their actions to dynamic situations. This process enhances movement efficiency, timing, and balance, which are essential components in performing the sepak takraw service technique.

Furthermore, the findings of this study are consistent with the principles of Long-Term Athlete Development (LTAD), which emphasize that training for young athletes should prioritize fundamental movement skills, coordination development, and enjoyment in sports participation. Athletes aged 11–12 years are in the "learn to train" phase, where structured training programs should focus on building technical foundations while maintaining a positive and engaging learning environment. The game-based training model developed in this study aligns with these principles by combining technical skill training with playful and interactive activities.

In addition, the findings support previous research indicating that game-based training approaches are effective in improving both technical skills and cognitive engagement in sports training. By simulating game-like situations, athletes are encouraged to apply their technical skills in realistic contexts while simultaneously developing coordination and decision-making abilities. This integrated learning process contributes to more effective skill acquisition compared to isolated technical drills.

The novelty of this study lies in the development of a training model that specifically integrates service technique training and coordination development within a game-based framework for beginner sepak takraw athletes. Previous training programs in sepak takraw have often focused on isolated technical drills, with limited emphasis on coordination development through structured game activities. The model developed in this research provides a more holistic training approach that simultaneously enhances technical performance, coordination ability, and athlete engagement.

Overall, the findings indicate that the game-based service and coordination training model is a valid, practical, and effective approach for improving fundamental skills among beginner sepak takraw athletes aged 11–12 years. The implementation of this model can assist coaches in designing more engaging and developmentally appropriate training programs, thereby supporting the long-term development of young sepak takraw athletes.

6. CONCLUSION

This study aimed to develop and validate a game-based service and coordination training model for beginner sepak takraw athletes aged 11–12 years. The results of the research indicate that the training model developed through the Research and Development (R&D) process is valid, practical, and effective for improving athletes' fundamental skills.

The findings from the needs analysis revealed that many beginner athletes experienced difficulties in performing accurate service techniques and lacked sufficient coordination training in their regular practice sessions. Based on these findings, a structured training model integrating service technique practice and coordination exercises through game-based activities was developed.

The results of expert validation showed that the training model obtained a very good feasibility rating, indicating that it is appropriate for implementation in youth sepak takraw training programs. Furthermore, the results of the field testing demonstrated a significant improvement in athletes' service skills and coordination abilities, as indicated by the increase in post-test scores compared to pre-test results.

In conclusion, the game-based service and coordination training model provides an effective and engaging training approach for beginner sepak takraw athletes. The model not only improves technical performance but also enhances coordination and athlete participation in training activities. Therefore, this training model can serve as a practical reference for coaches in developing more effective and developmentally appropriate training programs for young sepak takraw athletes.

REFERENCE

1. Aziz, A. R., & Teh, K. C. (2018). Physiological and performance demands of sepak takraw. *Journal of Sports Science and Physical Education*, 7(1), 15–25.

2. Balyi, I., Way, R., & Higgs, C. (2013). *Long-term athlete development*. Champaign, IL: Human Kinetics.
3. Bompa, T. O., & Buzzichelli, C. (2019). *Periodization: Theory and methodology of training* (6th ed.). Champaign, IL: Human Kinetics.
4. Borg, W. R., & Gall, M. D. (2003). *Educational research: An introduction* (7th ed.). Boston, MA: Allyn & Bacon.
5. Côté, J., Baker, J., & Abernethy, B. (2007). Practice and play in the development of sport expertise. In G. Tenenbaum & R. Eklund (Eds.), *Handbook of sport psychology* (pp. 184–202). Hoboken, NJ: Wiley.
6. Ford, P. R., Yates, I., & Williams, A. M. (2010). An analysis of practice activities and instructional behaviours used by youth soccer coaches during practice. *Journal of Sports Sciences*, 28(5), 483–495. https://doi.org/10.1080/02640410903582750
7. Gallahue, D. L., Ozmun, J. C., & Goodway, J. D. (2012). *Understanding motor development: Infants, children, adolescents, adults* (7th ed.). New York: McGraw-Hill.
8. Graham, G., Holt/Hale, S. A., & Parker, M. (2013). *Children moving: A reflective approach to teaching physical education* (9th ed.). New York: McGraw-Hill.
9. Harvey, S., & Jarrett, K. (2014). A review of the game-centred approaches to teaching and coaching literature since 2006. *Physical Education and Sport Pedagogy*, 19(3), 278–300. https://doi.org/10.1080/17408989.2012.754005
10. Holt, N. L., & Neely, K. C. (2011). Positive youth development through sport. *Routledge Handbook of Youth Sport*, 55–68.
11. Jawis, M. N., Singh, R., Singh, H. J., & Yassin, M. N. (2005). Anthropometric and physiological profiles of sepak takraw players. *British Journal of Sports Medicine*, 39(11), 825–829. https://doi.org/10.1136/bjsm.2004.016915
12. Kirk, D. (2010). *Physical education futures*. London: Routledge.
13. Light, R. (2013). *Game sense: Pedagogy for performance, participation and enjoyment*. London: Routledge.
14. Magill, R. A., & Anderson, D. (2017). *Motor learning and control: Concepts and applications* (11th ed.). New York: McGraw-Hill Education.
15. Metzler, M. W. (2017). *Instructional models for physical education* (3rd ed.). New York: Routledge.
16. Mosston, M., & Ashworth, S. (2008). *Teaching physical education* (1st online ed.). Columbus, OH: Merrill Publishing.
17. Otte, F. W., Millar, S. K., & Klatt, S. (2019). Skill training approaches in sport: A review of motor learning and ecological dynamics. *Frontiers in Psychology*, 10, 173. https://doi.org/10.3389/fpsyg.2019.00173
18. Rink, J. (2014). *Teaching physical education for learning* (7th ed.). New York: McGraw-Hill.
19. Schmidt, R. A., & Lee, T. D. (2019). *Motor learning and performance: From principles to application* (6th ed.). Champaign, IL: Human Kinetics.
20. Stone, M. H., Stone, M. E., & Sands, W. A. (2007). *Principles and practice of resistance training*. Champaign, IL: Human Kinetics.
21. Stratton, G., Reilly, T., Richardson, D., & Williams, A. M. (2004). *Youth soccer: From science to performance*. London: Routledge.
22. Wein, H. (2017). *Developing game intelligence in soccer*. Champaign, IL: Human Kinetics.
23. Williams, A. M., & Hodges, N. J. (2005). *Practice, instruction and skill acquisition in soccer: Challenging tradition*. London: Routledge.
24. Wulf, G., & Lewthwaite, R. (2016). Optimizing performance through intrinsic motivation and attention for learning. *Psychonomic Bulletin & Review*, 23(5), 1382–1414. https://doi.org/10.3758/s13423-015-0999-9