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Development of a service training model to improve quadrant service accuracy in senior Sepak Takraw athletes in Gorontalo

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Abstract
This study aims to develop a service training model to improve quadrant serve accuracy in senior Sepak Takraw athletes in Gorontalo and to examine the feasibility and effectiveness of the developed hoop takraw pass training model for training passing accuracy.

This study is a Research and Development (R&D) project utilizing the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) development model. Eight subjects participated in the limited-scale trial, 20 in the large-scale trial, and 20 in the effectiveness test. The instruments used were a research questionnaire and a service test, which served as the effectiveness test instrument. Data were analyzed using the Likert scale, the Independent T-Test, and descriptive data analysis.

The study results indicated that (1) the service training model to improve quadrant serve accuracy in senior Sepak Takraw athletes in Gorontalo consists of seven movements specifically designed to improve serve accuracy. (2) The seven quadrant serve models were declared feasible through limited-scale trials, with a 90.6% valid data result, and a 889% valid data result from the large-scale trial. (3) The test for the effectiveness of the quadrant service training model using the Independent T Test obtained a sig. value (2-tailed) of $0.000 < 0.05$, showing the developed service training model influences on increasing service accuracy in senior Sepak Takraw athletes in Gorontalo.

Keywords: Accuracy, service practice, model development, Sepak Takraw

1. Introduction
According to Yilidis (Natal & Sipar, 2022) [5], sport is crucial to human life because it is a form of individual and social education that prioritizes intentional and systematic physical movements toward higher levels of quality. One of the most popular sports is sepak takraw. Sepak takraw is a game that utilizes a net and a rectangular court, and can be played both outdoors and indoors. Syam (2022) [7] also argues that sepak takraw is similar to badminton and volleyball, but it is played using the feet. The objective of the game is to effectively strike and return the ball, ensuring that it exits the opponent's court through a decisive offensive play. To score in Sepak Takraw, each player must master several fundamental techniques, including kicking, defense, and offense. In Sepak Takraw, there are fundamental and specific techniques that the players need to master, as stated by Adrian Sya'ban *et al* (2020) [6] that skillful play in Sepak Takraw require each player to acquire the basic technical skills including kicking (inside kick, outside kick, toe kick, sole kick, and heel kick), heading, chest control, thigh control, and shoulder control. Furthermore, several key techniques that Sepak Takraw players must master include serving, receiving, passing (commonly referred to as delivery), smashing, and blocking (Ariyanto & Antoni, 2023) [2].

Quadrant is one of the new categories in Sepak Takraw, which is also a mainstay of the Indonesian team at the 2018 Asian Games in Palembang. The quadrant category is slightly different from other categories, both in terms of the number of players and the. Players in the quadrant category consist of six people, comprising four core players and two reserve players. The kick-off (service) execution procedure in the quadrant game is unlike other categories, as it is executed inside the *tekong* (server) circle but from outside the back line of the court.

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Each player can serve, which differs from the double category, where players take turns serving from behind the line.

Serving is one of the required fundamental skills for takraw players (Abdillah & Irawan, 2023) [1]. Serving is referred to as the initial attack in Sepak Takraw and signifies the start of the match. Serving is the method used to initiate a game or match in Sepak Takraw. To execute a good and deadly serve, proper training is necessary for service techniques, especially in the quadrant category. A good Sepak Takraw serve delivers a fast and sharp ball, unanticipated by the opponent, and enters the opponent's court over the net. Hanif (2015: 29) [3] states that mastering service techniques is essential, considering (1) that with a serve, a team can produce points or numbers; (2) with a serve, a team can lead the match according to the type desired by the serving team; (3) the serve is the first attack against the opposing team.

To stop a service ball, especially a quadrant service, a *tekong* must not only deliver the ball over the net but also ensure precision to outsmart the opponent's defense, making it difficult for the opponent to anticipate. As stated by Abdillah & Irawan (2023) [1], if the service passes the net, the service is declared as successful, and the opponent may return the ball over the net. To complicate the opponent's return, a *tekong* should master various service types to create confusion during the reception of the service ball.

Based on initial observations at Sepak Takraw clubs in Gorontalo, the accuracy of the quadrant among senior Sepak Takraw athletes is still lacking. Serves often hit the net and even go out of the opponent's court (out ball). After direct observations and unstructured interviews with club coaches, the issues above are attributed to the lack of a quadrant serve training model being implemented by the coaches. The training model provided is still limited and remains monotonous, mainly involving athletes tossing the ball and hitting it over the net without considering the distance of the toss and the height of the athlete's leg during serve. If these elements are not properly aligned, the serve will hit the net and fail to reach the opponent's court. Furthermore, the lack of foot swing speed during ball contact results in an incorrect foot impact, causing the ball to miss its intended target.

Considering the above, various efficient training models are needed to enhance the accuracy of the quadrant service for senior Sepak Takraw athletes. Previous research relevant to the problem above, entitled "Development of a *Sila* Service Skills Training Model in Sepak Takraw Games" (2024) by Sardiman, revealed that the *sila* (inside kick) service training model can be used and practiced by students. In addition, a study entitled "Development of a Sepak Takraw Overhead Service Training Model as a Form of Sepak Takraw Extracurricular Training Activity" (2022) by Rengge *et al*., revealed that the Sepak Takraw overhead service training model was declared "Feasible" to be used as a final product and can be used as a form of basic technique training for overhead service in Sepak Takraw games at the junior high school level.

Recognizing the importance of service training models for enhancing quadrant service accuracy in Sepak Takraw, the researchers developed a service training model to improve quadrant service accuracy among senior Sepak Takraw athletes in Gorontalo.

2. Materials and methods
This research falls under the category of research and development (R&D), which is a systematic process aimed at improving an existing product. The development model uses ADDIE (Analyze, Design, Develop, Implement, and Evaluate) model. The subject experts in this study consisted of two subject matter experts and two media experts. The test subjects were eight athletes from the Kayu Merah Sepak Takraw club for the limited-scale trial and 20 athletes from the Keris Sakti Sepak Takraw club for the large-scale trial. Furthermore, the effectiveness test subjects were 20 athletes from the Keris Sakti Sepak Takraw club.

The data collection instrument for expert validation, as well as for both limited-scale and large-scale trials, utilized a questionnaire that includes statements and scores to be assessed by experts and test subjects. Furthermore, the effectiveness test utilized an experimental method with a standardized service test. Data analysis for product validation, including both limited-scale and large-scale trials, employed a Likert scale. The effectiveness test, on the other hand, utilized statistical analysis with the Independent T-Test to measure the effectiveness of the developed service training model.

3. Results & Discussion
The results of this study revealed 7 hoop takraw passing training models, which were developed and deemed feasible based on validation by subject matter experts and media professionals. Expert validation results indicated that the training model for improving quadrant serve accuracy in senior sepak takraw athletes in Gorontalo was categorized as very feasible, with a percentage of 94.60%. Furthermore, limited-scale product trials achieved a 90.63% score, categorized as very feasible, and large-scale product trials achieved an 89% score, also categorized as very feasible.

Furthermore, the effectiveness test using the experimental method on 20 athletes of the Keris Sakti Sepak Takraw club as subjects with a Pretest-Posttest Only Control Group Design research design were carried out for 12 meetings, drawing the hypothesis test results as follows (1) Data of the Service Accuracy in the Experimental group showed pre-test (mean of 15.70 and SD of 3.199) and post-test (mean of 30.80 and SD of 3.011), while in the Control group showed pre-test (mean of 16.80 and SD of 2.201) and post-test (mean of 19.00 and SD of 2.055). (2) The results of the normality test showed a pre-test p-value of $0.773 > 0.05$ and a post-test of $0.947 > 0.05$, which means the data are Normal. (3) The results of the homogeneity test obtained a significance value (sig.) based on Mean of $.501 > 0.05$, so it can be concluded that the variance of the post-test data of the experimental group and the post-test data of the control group are the same or homogeneous. (4) The results of the Independent Sample t-test obtained a sig. value (2-tailed) of $0.000 < 0.05$, so it can be concluded that there is an influence or there is a difference.

4. Conclusions
(1) There are seven service training models to improve quadrant service accuracy in senior Sepak Takraw athletes in Gorontalo, presented in a video learning media product featuring explanations, implementation procedures, and transparent images that are easy-to-understand and reader-friendly. After undergoing various statistical analyses, they have been declared suitable and effective for use. (2) Based on the results of expert assessments and trials on research subjects, the results show that the developed service training model can improve service accuracy in senior Sepak Takraw athletes in Gorontalo.

5. Acknowledgments

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