IJPESS
Indonesian Journal of Physical Education and Sport Science
p-ISSN 2775-765X | e-ISSN 2776-0200
Volume 4, No. 4, December 2024. Page. 497-507
http://journal.unucirebon.ac.id/index.php ijpess

Groundstroke Training Equipment Innovation for Beginner Tennis Players

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Received: 29 September 2024, Approved: 15 November 2024, Published: 30 December 2024

Abstract

Study Purpose. Forehand and backhand groundstrokes are the basic strokes in tennis that need to be mastered. The training process needs to be supported by the availability of training equipment facilities so that it can help athletes and coaches to achieve training goals. The aim of this research is to produce an innovative tennis groundstroke training tool for beginner players. The novelty in this research is that it produces an innovative tennis groundstroke training tool that can be used for forehand and backhand training.

Materials and Methods. This research is research and development research. The research design in the research uses the ADDIE development model. The sample was 19 novice tennis players from Sabumi Tennis Club Banjarbaru.

Result. 1) The development of training equipment has gone through the stage of identifying the needs of athletes and coaches with the results in the very needed category, 2) The results of validation testing obtained an expert validity score of 90.47% in the very good category, 3) The small trial stage obtained a score of 85.4% in very good category. The large trial stage obtained a score of 89.56% in the very good category. 4) The response of the trainer who carried out the assessment concluded that the training tools were very suitable and useful to be applied in the training process.

Conclusion. 1) Researchers produced a training tool called "Double Drop ball". 2) This tool can be used to practice forehand and backhand groundstrokes for beginner players. 3) The advantage of this tool is that it can be used for forehand and backhand groundstroke training 4) The disadvantage of this tool is that it is limited to groundstroke practice 5) Recommendations for researchers can develop a multifunctional tool for practicing other basic techniques.

Keywords: Tennis, Trainning, Beginner.

DOI: https://doi.org/10.52188/ijpess.v4i4.849

Introduction

Tennis is a prestigious sport that is in great demand by the public (Irawan, 2019). This sport can be developed into achievements at both student and general levels (Bakhtiar &

Ballard, 2015). Many numbers are contested in tennis championships. At regional and national level championships, this sport becomes a prestigious sport if it can achieve achievements. The seeding process takes a long time, resulting in many areas lacking tennis athletes. In South Kalimantan, tennis achievements still require special attention. Based on data in the field, there are still a lack of areas that facilitate tennis coaching for beginners. At regional student championships, not all cities and districts send athletes. In addition, due to a shortage of student athletes, the championships are combined between educational unit levels. The following is data on student championship participants in South Kalimantan.

Tabel 1. Popda Tennis Field Participants in 2022 in South Kalimantan

Region	BJM	BJB	BJR	TLA	HSS	HST	HSU	BTL	BLN	KTB	TPN	TBB	BTL
ES							1	1			1	1	
JHS		2	2	2	1	1		1		1	2	1	
SHS	4	2	1	1	1				1		1		

Data Source for the 2022 Popda Tennis Committee (Arief RH, 2022)

Based on these conditions, theoretically sports achievements require the promotion of sports in society. This marketing is done by socializing or providing opportunities for coaching in areas so that interest in this sport increases. After the community actively participates in training and coaching training, training methods are needed that can help the community to train well. For beginner players, every exercise will definitely be trained to do or start tennis, with forehand and backhand groundstrokes (Alim, 2019). Forehand and backhand groundstrokes are strokes made with the ball bouncing first on the court. This technique is the basis of tennis so you can play tennis. In the match, groundstrokes were dominantly used by player Rahfi Uria. This blow is very important for players to use when attacking or defending. Complete mastery of forehand and backhand groundstrokes will make it easier for players in matches. This complete ability allows players to control both the forehand and backhand sides.

This technique is the basis of tennis so you can play tennis. In an effort to be able to master the stroke well, the coach gives the players the opportunity to practice the stroke as much as possible (Yusuf et al., 2019). Giving repeated opportunities to hit is called drill practice. Drill exercises are exercises that can be used by novice players to gain movement automation. This exercise is effective in providing increased training, this is according to research (Fauzan et al., 2024) that drill exercises that are programmed and arranged systematically and carried out repeatedly or continuously have a significant impact on tennis players' mastery of groundstrokes. The frequency of exercise done frequently will provide a lot of movement experience (Satria Armanjaya, 2018). Each person's frequency of movement training should be as large as possible to achieve movement automation. Coaches can also use the available sports facility tools as effectively as possible (Guntur, 2009) to give players the opportunity to practice acquiring movement automation. Based on this, coaches need to give players the frequency to practice as much as possible to be able to obtain good movement skills.

In the development of modern sports coaching and training, the training process makes a lot of use of training support facilities (Aulia & Asfar, 2021). This facility is used for effective training so that people can train optimally to improve their abilities. The use of training facilities can help in the training process. In tennis training, the use of training facilities has been used. Some of the training facilities commonly used in tennis training are ball throwing equipment (Amni et al., 2017; Sukardi et al., 2021), rope ball (Sidik et al., 2023), wall drill (Santosa & Soegiyanto, 2016), and others. The identification of problems in this research shows that when practicing groundstrokes, it is necessary to use training facilities. The use of training facilities is very necessary to produce effective training. Based

on these conditions, researchers will create an innovative tennis training tool for beginners that can be used to practice forehand and backhand groundstrokes. It is hoped that the importance of developing this training tool can overcome delays in mastering groundstrokes by novice tennis players. This research is different from previous research in terms of innovation in that the resulting tool can be used to practice forehand and backhand groundstrokes. The novelty in this research is that it produces an innovative tennis groundstroke training tool that can be used for forehand and backhand training.

Materials and Methods

Study participants

The subjects of this research were 19 novice players from the Sabumi Banjarbaru tennis club. The sampling technique in this research used total sampling. The total sampling technique is sampling by taking all members of the population or the same as the total population (Sugiyono, 2016). The subjects of this research consisted of 13 men and 6 women. The subjects of this research have been practicing tennis at the Sabumi Banjarbaru tennis club for 3 months.

Study organization

This research uses the Research and Development method. According to (Iwan Fachrozi et al., 2020; Sugiyono, 2016) The research and development method is used to create new products through a series of scientific methods starting with needs analysis and ending with product effectiveness testing. The development steps carried out by researchers are guided by the Research and Development ADDIE (Analysis-Design-Develop-Implement-Evaluate) design which functions as a guiding framework in complex situations, so that it is appropriate in the process of developing products (Nada Aldoobie, 2015). The results of the development research are product tools for groundstroke training that can be used by beginner players in tennis.

Development steps based on ADDIE are carried out according to stage 1) Analysis. Activities related to analyzing work situations and training environments for both coaches and athletes so that product needs can be discovered that need to be developed. 2) Design. Product planning activities are in accordance with the needs and suggestions of coaches and athletes. 4) Development. Manufacturing activities, product testing, and obtaining validation from experts. 5) Implementation. Activities using the product. 6) Evaluation. The activity assesses whether each step that has been made is in accordance with the specifications or not. From the results of these development steps, a product was obtained for groundstroke training which can be used by beginner players in tennis.

Statistical analysis.

Data analysis is used to obtain information from raw data to be processed using formulas so that conclusions can be obtained (Fitri et al., 2024; Usmandhau et al., 2024). The stages in carrying out descriptive percentages are as follows: 1) Calculating the value of the subject in each aspect, 2) recapping the value, 3) calculating the percentage using a formula. In this research, the data analysis formula uses descriptive percentages based on the formula (Arikunto, 2016).

$$P = \frac{X}{Xi} \; x \; 100\%$$

Information:
P = Percentage
X = Number of score answers
Xi = Maximum number of answers

Results

The results of this research are presented based on research and development steps. A description of the results of research implementation at each stage is explained in the following section:

Analysis

At this stage, needs are identified. The results of identifying needs can become the basis for developing training tools. A needs analysis was carried out for tennis coaches and player. From the results of the needs analysis, it was found that 80% answered that coaches need to use tools in training, 88% answered that using tools in training can have an impact on developing players' abilities, 87% agreed that in training it is necessary to use tools, 86% agreed with the development of training tools tennis. The results of suggestions from coaches and players, input was obtained regarding the training equipment products that will be developed, which include 1) training equipment that can be used to facilitate the groundstoke training process because the groundstoke shot is a basic stroke and needs to be mastered and developed in tennis. This is in accordance with the statement from (Ardianto et al., 2023; Safitri & Masykur, 2017) that groundstroke training is a stroke that really needs to be mastered by players because in matches this stroke is most often used both for gaining points and for defense, 2) groundstroke training consists of forehand and backhand so training tools must be able to be used to practice both strokes, and 3) easy to operate by coaches and players.

Design

The data collected at the analysis stage is used as a basis for designing training tools that will be developed. At this design development stage the researcher begins to develop design. Through the use of this training tool, the coach does not need to throw the balls one by one. Coaches can observe the hitting process by players and can evaluate the movements by players. The way this tool works is 1) the ball is filled at the top, 2) the ball will move downwards, 3) the player waits for the ball to fall until it bounces and then can hit the ball.

Figure 1. Initial Design Of Training Equipment

Development

The development stage is carried out through a product validation process with experts. Expert validation is carried out to obtain the level of suitability from experts and obtain advice from experts. The results of this validation are then used by researchers to make product improvements. The experts tasked with being validators of this training equipment product are Mrs. Novi Rosilawati who is the coach of the South Kalimantan PON contingent tennis team and Mr. Syafrudin who is the South Kalimantan PPLP tennis coach. From the validation results of experts who obtained the data:

Table 2. Expert Validation Results

Aspect	Score	Percentage	Description
Physical	71	88,75	Very suitable
Design	26	86,67	Very suitable
Function	48	96	Very suitable
	145	90,47	Very suitable

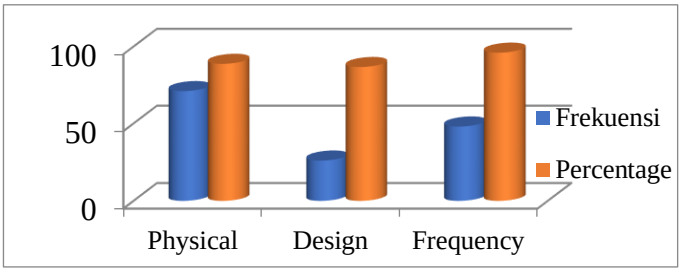

Figure 2. Expert Validation Results

Based on the expert validation results, it was found that the physical aspect of the training equipment was 88.75%, which means the product is very suitable for training. The design aspect was obtained at 86.67%, which means the product is very suitable for training. The function or usability aspect was obtained at 96%, which means the product is very suitable for training. After the expert has carried out an assessment, the expert also provides suggestions for improving the product. Advice from experts includes:

Table 3. Results of Expert Advice

Recommendation	Improvement
It needs to be made into a tool that can train the sides for forehand and backhand training Improvement: system X was created to link tools into 1	
The ball capacity is increased Improvement: ball capacity extended to hold more than 15 balls	
Need to regulate the speed of the ball falling Improvement: there is a magnet as a replacement for the pendulum to regulate the speed of the ball falling	
The height of the tool can be adjusted according to needs Improvement: the height of the tool can be raised and lowered	
Giving name the training tool that characterizes its function so that it is easy for users to remember	This tool is called double drop ball

Implementation

After improvements have been made according to expert advice, the next stage is implementing the tools in the training process. In the process of implementing the exercise,

researchers implemented it in small groups and large groups. Previously, after receiving naming suggestions from experts, this tool was named double drop ball. The double drop ball, as the name suggests, is a tennis training tool that functions to drop the ball automatically via a seesaw system to be used to practice tennis forehand and backhand strokes together.

Figure 2. The Tools Double Drop Ball

Small Group Trials

Based on the ADDIE development steps (Nada Aldoobie, 2015), trials need to be carried out on small groups. Small groups are groups whose numbers are limited. Small group trials were carried out on 9 people. Sample determination was carried out using a random sampling technique by taking samples from the population at random without paying attention to the strata in the population and each member of the population (Arikunto, 2016). From the results of the small group test, the following results were obtained:

Table 4. Small Group Test Results

Aspect	Score	Percentage	Description
Physical	38,25	85	Very suitable
Design	38,67	85,9	Very suitable
Function	38,4	85,3	Very suitable
	115,3	85,4	Very suitable

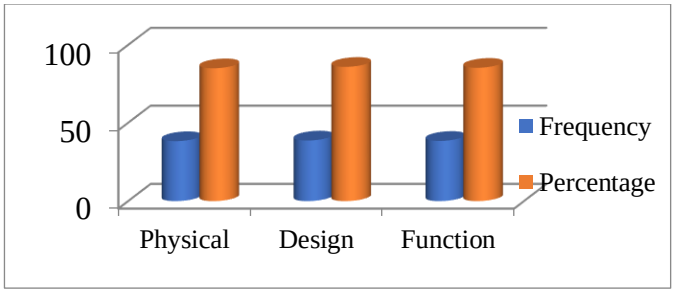

Figure 3. Expert Validation Results

Based on the results of small group tests, it was found that the physical aspect of the training equipment was 85%, which means the product is very suitable for training. The design aspect was obtained at 85.9%, which means the product is very suitable for training. The function or usability aspect was obtained at 85.3%, which means the product is very suitable for training.

Large Group Trials

After carrying out a small group test and obtaining the results that the double drop ball training tool was very suitable for use in the training process, the next step taken by the researchers was to carry out a large group test. Large group trials were carried out on 19 people. From the results of the large group test, the following results were obtained:

Table 5. Large Group Test Results

Aspect	Score	Percentage	Description
Physical	85,75	90,3	Very suitable
Design	84	88,42	Very suitable
Function	85,5	90	Very suitable
	255,3	89,56	Very suitable

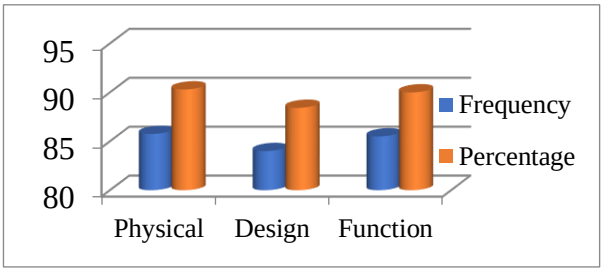

Figure 4. Expert Validation Results

Based on the results of large group tests, it was found that the physical aspect of the training equipment was 90.3%, which means the product is very suitable for training. The design aspect was obtained at 88.42%, which means the product is very suitable for training. The function or usability aspect was obtained at 90%, which means the product is very suitable for training.

Evaluation

At each stage of making this training tool, researchers carry out evaluations to improve this training tool to make it more attractive and in accordance with responses from users and experts. Researchers carried out formative evaluations in the process of developing this training tool. Formative tests are carried out by including a comment column that can be filled in by respondents. Based on the results of the questionnaire distributed to respondents, several suggestions for improvement were obtained. In the next stage, the researcher re-improves the product that has been developed. This is done to produce more viable products. After carrying out a series of research and development stages, the double drop ball training tool has the advantages of 1) the training tool meets training needs, 2) the use of the tool is more effective in training because it can be used to practice forehand and backhand strokes together, 3) the height of the flexible tool can be increased and lower it according to needs, 4) the tool is easy to assemble, 4) the tool can be used anywhere and at any time either independently or programmed by the trainer, 5) safe to use as a training tool. This tool also has disadvantages. Disadvantages that can be identified include 1) the manufacturing process requires precision because it uses a lever mechanism to produce an automatic and stable ball fall, 2) the tool is quite heavy, especially when using iron, 3) this tool is still limited to use for groundstroke practice.

Discussion

This double drop ball tool was developed based on Research & Development (R&D) procedures in accordance with the development stages of ADDIE (Rusdi, M., 2018). From the results of the needs analysis, 87% of the results showed that in the training process it was necessary to use tools to help achieve the training objectives. This is in accordance with (Sriwana, 2020) that the use of equipment in sports can provide motivation to users to be more enthusiastic in training and can have the impact of carrying out training more optimally, apart from that, the use of training equipment can also show the professionalism of the

trainer's services (Tarigan et al., 2023). The use of tools in training can be a supporting factor in improving basic technical abilities. The use of tools in training can attract interest in training so that during the training process there will be no boredom (Hidayat, 2021).

Determining the design of the tools developed in accordance with the suggestions and functions in using training tools. This tool was developed based on the needs in groundstroke training. This exercise was chosen by researchers because groundstroke training is a basic exercise or the first exercise that players must develop mastery over. Apart from that, groundstroke training is an exercise that is often done by players in matches. Based on research results from (Nababan & Sinulingga, 2021), Players often hit groundstrokes in a match as much as 35 – 45% of all strokes. The success rate in matches to gain points is also very high. Based on research results from (Fahmi Seff, 2016) Players earn points from hitting groundstrokes with a success rate for forehands of 83% and backhands of 57%. The importance of groundstrokes in matches means that coaches always provide this exercise in every program.

At the development stage, this training tool received validation from experts. The selection of experts requires that they be relevant to the field of study (Waruwu, 2024). The experts in this research are professional tennis coaches at national level. Based on the results of expert validation, the physical aspect of the training equipment was obtained at 88.75%, the design aspect was obtained at 86.67%, and the functional or usability aspect was obtained at 96%, which means the product is very suitable for training. Validation from this expert is the first step to determine the suitability of the product being developed with the needs to solve problems in the field. In accordance with product development characteristics (Iwan Fachrozi et al., 2020) that the final result of research and development research is developing theories in the form of real products to improve or improve the quality of the research. At the development stage, researchers obtained advice from experts. This suggestion is an improvement on the design that has been produced to be perfected. Experts provide advice in the development stage according to the weaknesses that arise when this product is observed in the operational process. After the product has been improved, the researcher implements the product to be tested in practice.

The results of small group trials showed that the physical aspect of the training equipment was 85%, the design aspect was 85.9%, and the function or usability aspect was 85.3%, which means the product is very suitable for training. At the small group trial stage, this training tool needs to achieve minimum appropriate assessment criteria so that it can be applied in large group trials. In the product development process, physical aspects are one of the things that need to be considered (Nurjanah et al., 2019). The physical aspect has an influence in providing motivation in using training equipment. The suitability of the tool model with the function of the tool must be considered so that the design of the tool is more attractive. From these considerations it will produce an attractive product.

The results of large group trials showed that the physical aspect of the training equipment was 90.3%, the design aspect was 88.42%, the function or usability aspect was 90%, which means the product is very suitable for training. Large group testing is used to substantiate the usefulness of exercise products (Okpatrioka, 2023). Large group testing does not function to perfect the product because the product is deemed suitable and can be applied in practice. This large group test serves to test the feasibility and usefulness of the product in groundstroke training.

Every product produced cannot be separated from product advantages and disadvantages. The results of product advantages and disadvantages can be obtained from the evaluation process after the tool is used. Evaluation of training equipment products is an important part of the development process. Researchers can see opportunities from using tools to achieve the expected goals through product advantages. Apart from that, researchers can

see product weaknesses from deficiencies that appear when the tool is used in the training process.

Conclusions

Based on the research results, it can be concluded that this development research produced a tennis groundstroke training tool product called the double drop ball. This tool can be used to practice forehand and backhand groundstrokes for beginner players. This tool has received validation from experts of 90.47% in the very suitable category. The trial results in the small group were 85.4%, and the trial results in the large group were 89.56% which fell into the very suitable category. The advantage of this tool is that it can be used for forehand and backhand groundstroke training. The disadvantage of this tool is that it is limited to groundstroke practice. Recommendations for researchers can develop a multifunctional tool for practicing other basic techniques.

Acknowledgment

Penulis mengucapkan terimakasih kepada Universitas Lambung Mangkurat yang telah memberikan kesempatan untuk berkontribusi dalam penelitian bidang olahraga. Penulis juga mengucapkan terimakasih kepada seluruh pemain dan pengurus Klub Sabumi Tenis Banjarbaru atas dukungan dalam terlaksananya penelitian ini. Penulis mengucapkan terimakasih kepada tim lapangan yang membantu menyusun produk alat latihan dan melaksanakan penelitian.

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Cite this article as: Fauzan, Lazuardy Akbar. *et al*. (2024). Groundstroke Training Equipment Innovation for Beginner Tennis Players. *Indonesian Journal of Physical Education and Sport Science (IJPESS)*, *4*(4), 497-507. https://doi.org/10.52188/ijpess.v4i4.849