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THE INNOVATION OF RETURN BOARD ASSISTANCE FOR BACKHAND AND FOREHAND ON TENNIS TRAINING

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ABSTRACT

Coaching in the sport of tennis requires more funding sources, especially in facilities and infrastructure. Supporting tools can facilitate the achievement of influential achievements. This research used ADDIE model, the return board tool was developed for tennis athletes at the Sports Science Faculty, Universitas Negeri Jakarta. The study worked with 20 athletes, three table tennis coaching experts, and two sports education experts. T-Test of mean difference = 0 (vs not = 0): T-Value = -12.61 P-Value = 0.000 Since the p-value (0.000) <0.01, it can be concluded that there is a significant difference between pretest and mean scores posttest score. The mean posttest score was greater than the mean interpretation score. There was an increase in the score of 8.7 or an increase of 32%. Thus the return board tool can increase the ability of forehand spin with an increase of 32% effectiveness.

INTRODUCTION

According to Fenter (Fenter, Marzilli, Wang, & Dong, 2017), the average player groundstroke in a game is 35 - 45% of the total strokes during a game or match. Thus, it is necessary to innovate a variety of training aids in order to attract the attention of athletes to keep their enthusiasm for training so that they can master good forehand groundstroke and backhand groundstroke techniques so that they can achieve maximum performance (Myers, Sciascia, Kibler, & Uhl, 2016). Sports achievement is determined by the player's appearance in participating in a match (Allen, Haake, & Goodwill, 2010). In competition, athletes need to give good performance through practice and effort. Besides that, a coaching program also forms the basis for athletes to achieve higher achievements than before(Caroline Martin, Kulpa, Ezanno, Delamarche, & Bideau, 2016). The success component in groundstroke is based on the experience of the tennis coach in Universitas Negeri Jakarta, namely; able to hit the ball that is fed by the feeder with his hands and direct the ball to the side of the field that is difficult for the opponent to reach(García-González, Moreno, Moreno, Iglesias, & del Villar, 2012). The success of the groundstroke must pay attention to the most

crucial body balance. If it is not balanced, it will not be able to hit the ball perfectly (C. Martin, Bideau, Touzard, & Kulpa, 2019).

Hitting the ball well and correctly is one of the basic principles in the game of tennis that must be mastered (Iwatsuki, Takahashi, & Van Raalte, 2016). The ability of a tennis athlete to hit a good shot will support her performance in playing tennis. According to Loffing, Wilkes, and Hagemann (Loffing, Wilkes, & Hagemann, 2011), excellent physical condition is one of the factors that play an important role in playing tennis, including supporting the results of the groundstroke. Physical condition is essential for the game of tennis. The ability to be in the physical condition is one of the factors to support the mastery of groundstroke techniques in tennis (Sukarmin & Ndayisenga, 2020). Based on King (King, 2018) study, the elements of physical condition in tennis sports consist of cardiovascular-respiratory endurance (endurance), muscle strength, explosive power, speed, agility flexibility, and balance, coordination (coordination), and accuracy (accuracy). Forehand and backhand strokes in tennis are basic strokes that a player must master. This type of stroke is most often made while playing. As stated by Reid et al. (Reid, Whiteside, & Elliott, 2010) that the average player performs groundstroke forehand and backhand in the game, 35-45% of the total strokes during a game or match. Therefore, there needs to be a tool in training that attracts the attention of athletes to keep the spirit of training, so that it can improve the quality of good forehand groundstroke and backhand groundstroke techniques (Hansen et al., 2017).

This tool is made from materials that are environmentally friendly and original from Indonesia. In addition, the creation of this tool will provide a new color in the coaching field, especially tennis. This tool is believed to be able to improve the quality of the hitting technique in tennis, especially forehand and backhand groundstrokes. The purpose of this study was to create a return board tool for groundstroke forehand and backhand tennis. However, this tool can not only be used to practice these two types of strokes but can be used in practicing other types of stroke techniques. Based on the problem limitation described, the results of the development of this tool were only tested on 2 types of blows, namely; forehand and backhand groundstrokes..

MATERIAL AND METHODS

This research uses ADDIE (Analysis-Design-Develop-Implement-Evaluation) instructional design model developed by Reiser and Mollenda in Campbell (Campbell, 2014) is a generic learning/training design model that serves as a guide in building useful, dynamic, and supportive training program tools and infrastructure. The training performance itself. To help training instructors in managing training and learning(Trust & Pektas, 2018).

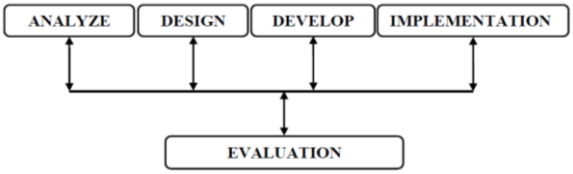

Fig 1. ADDIE Model
Source: Trust and Pektas (Trust & Pektas, 2018)

Needs Analysis

In this stage, the researcher conducted a needs analysis to determine the specifications of the tennis return board tool to be made. The second step that the researcher will take in the analysis stage is to determine the research objectives. Researchers used a quantitative approach to measure the level of concentration and needs of athletes on the forehand and backhand in tennis. The researcher prepared the tools and equipment for the tennis skills learning outcomes test, namely:

a. Tennis
b. Tennis racket
c. Tennis ball
d. Meters and duct tape to measure and outline the target score
e. 1 ball basket, rope, stationery and research results recording form

In the forehand drive test, the validity coefficient is 0.76, and the reliability coefficient is 0.85. For this reason, the purpose of this test is to measure the ability to make a forehand stroke. While the backhand validity coefficient is 0.72, and the reliability coefficient is 0.88. Researchers collaborated with 17 athletes and three tennis coaches at the Universitas Negeri Jakarta. This test is done to see the readiness of the athlete in the forehand and backhand. In the forehand and backhand, the ball is hit must be over the net and under the rope into the court to score as many points as possible. Then chose ten balls to return with forehand and backhand. The ball that is hit on the rope and enters the scoring area is half the general value. For the rating scale, the researcher used the category (Aslan, Kurugol, Cetin, Karakaşlilar, & Koturoɬlu, 2015):

Table 1 Category Scale

Norm Range	**Category**
< Mean – 1.5 SD	Low
Mean – 1.5 SD until Mean – 0.5 SD	Less
Mean – 0.5 SD. until Mean + 0.5 SD	Moderate
Mean + 0.5 SD until Mean + 1.5 SD	Well
Mean + 1.5 SD <	Very well

Design

Design is the second stage of the ADDIE model. At this stage, the researcher clarifies the product specifications designed so that the product can achieve the objectives of the forehand and backhand training techniques as expected.

Fig 2. ***Return Board*** **Design**
Source: Private Document

Figure 2 shows the return board design that will be made using steel supports and banners. However, in the first design process, the researcher used a paralon base material with the right and left supporting lengths, according to Figure 2.

Development

The activities carried out in this stage are making tennis return board tools starting from the pre-production stage, the production stage, and the post-production stage. Next is to conduct trials on products that are being developed in order to determine the suitability of the product with the desired objectives. The tennis return board tool is reviewed and revised according to the feedback received. At the trial stage, the expert score was determined using a Likert scale. With the Likert variable scale to be measured, it becomes a variable indicator. Based on the above calculations, the percentage range and qualitative criteria can be defined as follows:

Table. 2 Percentage Scale

Percentage of Interpretation	**Value Scale**	**Quality**
76% - 100%	4	Excellent
51% - 75%	3	Good
26% - 50%	2	Poor
0% - 25%	1	Very Poor

Content validation was carried out using the Delphi technique, which was used referring to Kezar and Maxey (Kezar & Maxey, 2016) to five experts, namely three table tennis coaching experts and two sports education experts. The expert's assessment is carried out to make improvements to the initial product design developed, especially in terms of the accuracy of the table mark and the target size and target score, the accuracy of the rails used, the accuracy of the test instructions, the accuracy of scoring and to obtain limitation and parties related to the scientific field. The initial product is achieved when there has been an improvement of the accuracy of the table mark and the size of the target as well as the target score, the accuracy of the score used, the accuracy of the test instructions, the accuracy of the scoring.

Table 3 Instrument Tennis Expert Trial Data

No.	Aspect	Assessment				Description
		1	2	3	4	
1.	The return board tool for practicing tennis forehand and backhand techniques is easy to use at the backswing stage					
2.	The return board tool for practicing tennis forehand and backhand techniques is easy to use at the point of contact stage					
3.	The materials used on the returned board are in accordance with the requirements for practicing tennis forehand and backhand techniques at the follow-through stage					
4.	The return board design can train athlete concentration					
5.	Practical tool design					
6.	The design of the tool is made efficiently					

Evaluation

The evaluation was carried out after receiving input from experts consisting of tennis coaches and academics. Then the initial product revision is carried out to improve the product before the product is continued in the final stage of the extensive trial. Revisions were made based on input from empirical validation experts. The trial was carried out on a small scale and a wide scale. The data collection technique in the preliminary study used a survey method by asking tennis experts (coaches and academics) questions. In addition, observation techniques are also used to collect expert opinion information and information about return board products. From the data that has been collected, qualitative and quantitative analyzes are then carried out. In order to answer the research objectives and determine the effectiveness of the products produced in this

study, the data collected is processed and analyzed using techniques (1) descriptive analysis and (2) inferential analysis to determine the effectiveness of the use of assistive products.

RESULTS AND DISCUSSION

In this stage, the researcher conducted a needs analysis to determine the specifications of the tennis Return Board tool to be made. For this reason, the researcher conducted a forehand and backhand ability test on 20 respondents:

Table 4 Respondent Characteristics

Gender			
Man	**Women**		
18 (90%)	2 (10%)		
Age			
21 – 25 yo	26 – 30 yo	31- 35 yo	36-40 yo
8 (40%)	9 (45%)	2 (10%)	1 (0.5%)
Job			
Gender	**Coach**		
17 (85%)	3 (15%)		

Source: private document (2020)

Table 5 Frequency Distribution of the Forehand Ability of Field Tennis Athletes

No	**Norm**	**Category**	**Frequency**	**Percentage**
1	< 44, 22	Low	1	5.9%
2	44.22 - 56.95	Less	4	23.5%
3	56.95 - 69.69	Moderate	7	41.1%
4	69.69 - 82.42	Well	3	17.7%
5	82.42	Very well	2	11.8%
	Total		**17**	**100%**

Source: private document (2020)

Based on table 4.2, it shows that there is still one athlete (5.9%) who has a low ability on the forehand. In addition, four athletes (23.5%) were in the poor category, and seven athletes (41.1%) were in the moderate category. This analysis can be presented in graphical form as follows:

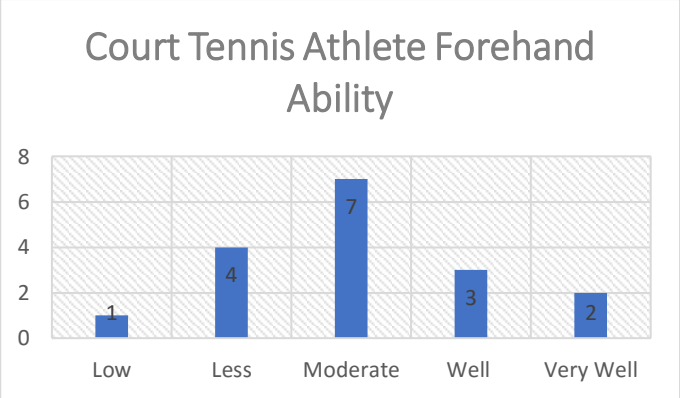

Fig. 3 The histogram of the athlete's forehand ability

Based on Figure 3, it shows that the medium category in forehand ability gets the highest results, namely seven athletes. The following are the results of the backhand abilities of tennis athletes.

Table 6. Frequency Distribution of Backhand Ability of Field Tennis Athletes

No	Norm	Category	Frequency	Percentage
1	< 30.03	Low	3	17.7%
2	30.03 s.d 46.99	Less	4	23.5%
3	46.99 s.d 63.94	Moderate	8	47%
4	63.94 s.d 80.01	Well	1	5.9%
5	80.01 <	Very well	1	5.9%
	Total		**17**	**100%**

Source: private document (2020)

Table 5 shows that the backhand abilities of tennis athletes in the low category are three athletes (17.7%). While in the less category, there were four athletes (23.5%) for the low category, namely eight athletes (47%). Each athlete is good and very good (5.9%). This analysis can be presented in graphical form as follows:

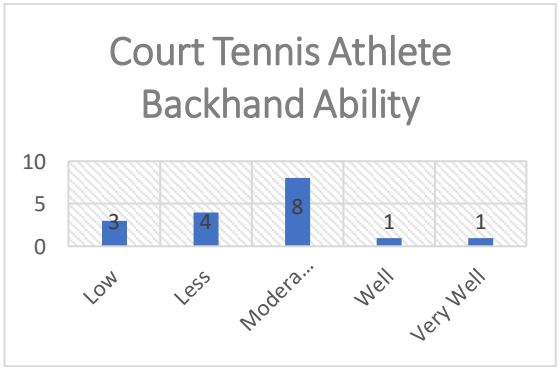

Fig. 4 The backhand ability of a tennis athlete

The second step that the researcher took in the analysis stage was determining

the research objectives. For this reason, researchers distributed questionnaires to 20 respondents with the results of the analysis, 78.3% of respondents needed tools. This was also conveyed by the tennis coach whose name was changed:

“Based on the results of the backhand and forehand abilities of tennis athletes, it can be seen that it is still very low. So that tools are needed to increase this ability.” (Susanto, 2020)

Based on the needs analysis, the researcher pre-produced the tennis return board tool.

Fig 5. *Paralon-made Return Board*
Source: private document (2020)

Based on Figure 4, the researcher uses a paralon, which is then cut according to the size in the design of Figure 5. After being cut, the paralon is assembled according to the design. It's just that at the bottom, it has two legs on the right and left and one support on the back. This is because the material used is not iron, so support is needed to hold the banner. The banner made does not match the design size in Figure 5. This is because it follows the paralon pattern. Before placing the banner on the returned board, the researcher designed the image first following the field; only it was adjusted to the existing paralon framework. The installation of banners is carried out by tying them with raffia to prevent them from falling apart.

Fig. 6 First Phase Trial of Paralone Return Board
Source: private document (2020)

In **Figure 6** the researcher conducted a trial with the team to determine the strength of the returned board when used for forehand and backhand. This tennis Return Board tool was reviewed by two teams of experts regarding tools and tool suitability with the needs for forehand and backhand. The result of expert validation is 59.35%. Thus it can be stated that the Paralon material return board is in the "feasible" category. However, there are notes for researchers to revise related to the design, tool design, and also the returned board tool for practicing tennis forehand and backhand techniques are easy to use at the point of contact stage(Kachel, Buszard, & Reid, 2015). In the next stage, the researcher made revisions according to the feedback obtained. To produce this tool that is good and according to target needs, in the process of making tennis Return Board aids are produced in several stages. The stages in making this tennis return board tool are the pre-production stage, the production stage, and the post-production stage.

Fig. 7 Second Stage Trial of Paralon Return Board
Source: private document (2020)

In **Figure 7**, one of the examiners from the academic field is experimenting with

a return board device.

Tabel 7 Second Stage Field Tennis Expert Trial Result Data

No.	Aspect Assessed	Score Obtained	Maximum Score	Percentage	Categories
1.	Equipment Eligibility	13	16	81.2%	Excellent
2.	Design Tools	6	8	75%	Good
Skor total		**17**	**24**	**78.1%**	**Excellent**

Source: private document (2020)

Based on table 7 it shows that the results of the revisions carried out by researchers got an increase from a total of 65.6% to 78.1% in the excellent category.

Tabel 8 Second Stage Expert Validation Data

No.	Aspect Assessed	Score Obtained	Maximum Score	Percentage	Categories
1.	Equipment Eligibility	15	16	93.7%	Excellent
2.	Design Tools	6	8	75%	Good
Skor total		**21**	**24**	**84.3%**	**Excellent**

Source: private document (2020)

In the second stage of validation, the percentage obtained is 84.3%. Thus, it can be stated that according to the expert, in the second validation stage, the category is very feasible. The usage test was carried out by comparing the results of the pretest and posttest samples (treatment group and control group). There were two treatment groups, namely novice athletes and advanced athletes. 14 athletes each. The results of the Pretest and Posttest concluded that: (1) the return board product can be used to improve tennis forehand strokes. The novice athletes had an effectiveness of 53%, and the advanced group had an effectiveness of 32%; (2) the return board product can be used as a training tool for junior, beginner, and senior table tennis athletes; (3) the return board product can be used as a means of motivating athletes in training by measuring the ability of each athlete's forehand stroke. From the results of the pretest and posttest, a different test was carried out with the t-test in each group. Before the t-test, a prerequisite test was carried out in the form of a normality and homogeneity test. Normality test The normality test was performed using the Anderson-Darling test, with a significance level of 99% (margin of error 1%). All computations were carried out with the help of Minitab 16 software. The summary of the normality test is as follows:

Table 8 Summary of Normality Test on Effectiveness Test

No	Kel.	Test	AD Score	p-value	Desct.1
	Advanced	Pretest	0.299	0.538	Normal
		Postest	0.597	0.096	Normal

Source: private document (2020)

From the results of the normality test, it can be concluded that all data groups are normally distributed so that the requirements for normality are met. The homogeneity test was carried out using the Levene test, with a significance level of 99% (margin error of 1%). In this differential test, the pretest scores are compared with the posttest scores in each group. The different test used is the t-test. The type of t-test used in this study was the Paired-T Test. All t-test calculations were carried out with the help of Minitab 16 Software.

Table 9 Paired T

Paired T for PRE-L-POS-L				
PRE-L	14	29.000	3.921	0.996
POS-L	14	37.714	3.930	0.999
Difference 14	14	-8.716	2.587	0.963

Source: private document (2020)

95% CI for mean difference: (-10,209, -7,224) T-Test of mean difference = 0 (vs not = 0): T-Value = -12.63 P-Value = 0.000 Because the p-value (0.000) <0.01, then It can be concluded that there is a significant difference between the mean pretest score and the mean posttest score. The mean posttest score was greater than the mean interpretation score. There was an increase in the score of 8.7 or an increase of 32%. Thus, the return board tool is able to increase the forehand capability with an increase of 32% effectiveness.

Table 10 Paired T

Paired T for PRE-L-POS-L				
PRE-L	14	19.000	2.829	0.757
POS-L	14	27.214	3.287	0.879
Difference 14	14	-8.23	4.28	1.16

Source: private document (2020)

5% CI for mean difference: (-10.69, -5.76) T-Test of mean difference = 0 (vs not = 0): T-Value = -7.23 P-Value = 0.000 Because p-value (0.000) <0.01, it can be concluded that there is a significant difference between the pretest and posttest scores in the beginner group. The average posttest score is greater than the average pretest score. The average increase was 8.7, indicating the tool had an effectiveness of 53% in this group.

DICUSSION

Based on the user trials that have been carried out, the results of the forehand return board tool are obtained as a means to improve the forehand ability of advanced tennis athletes. In line with Gescheit, et al (Gescheit et al., 2017) this tool can be used as a training tool for tennis athletes and also helps the coach's role during training as a target for the opponent's reflection in training. After experiencing a slowdown, development, improvement, discussion, and innovation, now the sport of tennis has become a world-wide sport that aims to be higher, faster, more complete, more accurate, and fast changing(Myers et al., 2016). Therefore based on Fenter, et al (Fenter et al., 2017) in the game of tennis, players suddenly move quickly, then stop, move again quickly and then jump, and so on, rotating steps back and forth without losing their balance. In line with Martin, et al (C. Martin et al., 2019), the forehand groundstroke the most important stroke or stroke in tennis. Currently, in tennis, as a player rallies on the baseline, the forehand will be the shot that is most often used to kill an opponent. Based on the evaluation results of the return board tool, it can be declared effective and helps athletes in performing groundstroke forehand(O'Connor, Huseyin, Whyte, & Lacey, 2020). Besides that, the movement of the body towards the ball and has determined the same zone the ball will hit. A good zone for hitting with a continental or eastern grip is in the area in front of the body, in the area around the bottom of the stomach(Krause, Farrow, Reid, Buszard, & Pinder, 2018). Therefore, this return board can provide an opportunity for athletes to practice. Some forehand drive steps are what every tennis player must do, namely pulling the racket back (backswing), hitting the ball (impact), and a follow-through. Backhand groundstrokes are generally considered to be more difficult to learn and are a potential weakness of an opponent that can be exploited(Busuttil, Reid, Connolly, Dascombe, & Middleton, 2020). It is just that, based on the results of the return board trial, it shows that tennis athletes can do Backhand Drive, which is a stroke where the racket and the ball meet in parallel.

CONCLUSIONS

Tennis sport is not only physical that can be relied on, but the importance of conceptualizing a game on the court is also needed. When processing the groundstroke, what you have to really understand is when you are going to do the basic techniques, because later on the other techniques will be easy to master. For this reason, it is necessary to master the techniques in tennis. These basic hitting techniques include groundstroke, volley, smash, and serve. But from some of these techniques that are more dominant when playing the forehand groundstroke and backhand groundstroke. For this reason, a return board tool is needed in tennis. Researchers developed a return board through two materials, namely iron and paralon. In the second stage of validation, the percentage obtained is 84.3%. Thus, it can be stated that according to the expert, in the second validation stage, the category is excellent. So, this tool is declared effective and efficient to help athletes' abilities in backhand and forehand.

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