Design of Table Tennis Tool for Drive Stroke Drill Training to Beginner

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Abstrak: The background of this research is the low level of skill in the punch of the beginners of table tennis. This makes it difficult for beginners to play table tennis. The purpose of this study was to produce a decent reflective board device, so that it was effectively used by beginners to improve the table tennis drive punch skills. This research is included in the type of research and development. The development model used is ADDIE consisting of five stages, namely analysis, design, development, implementation, and evaluation. This study involved 10 beginners of table tennis aged 12-15 years in Sukomoro Table Tennis Club. Data collection techniques using interviews, questionnaires, tests, and observations. The results of the assessment of the table tennis media experts showed the percentage of feasibility of the reflecting board equipment was 93.75%. It is interpreted that the reflective board tool is very good for use in drill blow drive drills for table tennis beginners. The results of the analysis of research data about the score of forehand drive with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.810. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. These results indicate that drill exercises using rebound boards can improve the forehand punch skills of table tennis beginners. The results of the analysis of research data about the score of backhand drive punch with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.805. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. These results indicate that drill exercises using rebound boards can improve the skills of backhand drive punches on table tennis beginners. So it can be concluded that the quality of the bounce board tool is very good and effective to be used by beginners to improve the skill of table tennis drive punching.

Key Words: Design, Tool, Drill Training, Drive Stroke, Table Tennis, Beginner.

1. Introduction

ICSTI 2018, October 19-20, Yogyakarta, Indonesia

DOI 10.4108/eai.19-10-2018.2282156

Table tennis is a sport that can be played by two people or four people. This game aims to hit the ball to the opponent's table so that the opponent cannot return the ball. The game starts with how to service forehand and backhand with the ball directed to the opponent's table. Table tennis rules are generally similar to field tennis, but the difference is that in table tennis ball cannot bounce twice on the table, except when starting a rally point with a service hit. Table tennis players are divided into several categories, namely backyard or garage players, beginners, intermediate players, advanced players, pre professional players, and professional players. This study focuses on table tennis beginners. Beginners need to practice the correct table tennis punch technique. This is to avoid motion errors that result in hand injuries and ineffective movements. Some characteristics of beginners are training with a coach, starting training with basic skills, learning basic rules, learning to apply skills and rules in an easy game, practicing drill to improve punch skills, starting the level of exercise intensity. Table tennis beginners are people who have just learned about rules, basic techniques, and violations in table tennis. Table tennis beginners need intensive training in order to master good table tennis skills, such as bet grip techniques, punch techniques, and footsteps. The beginner's goal of playing table tennis is to try table tennis as a sporting option, wanting to play table tennis with the right rules, wanting to join a group to increase friendship, and use table tennis as a time to exercise.

Based on observations of researchers in the field, a beginner is given the material to blow the drive by the trainer. Punch drive is the basic technique of attack on table tennis. Beginners practice the forehand drive punch technique and then continue to practice backhand drive techniques. Punching a table tennis drive or often referred to as an elevator is done by moving the bet from under the spine to the top and positioning the bet in a closed state. Drive punches are usually used as attack blows and can be controlled as desired. Drive punches can be done by forehand or backhand. A forehand drive is carried out when the ball comes from the opponent to the right side of the body, while the backhand drive is carried out when the ball comes from the opponent towards the left side of the body. Another characteristic of the drive is to punch with a long swing resulting in a flat and fast ball. Some features of a drive punch that is high or low flying ball above the net line height are easily mastered, fast or slow the speed of the ball will not be difficult to control, the ball is carrying a little rotation. Drive punches are carried out in three stages, namely the preparation stage, the ball introduction stage, and the ending stage.

In an effort to improve drive punch skills, beginners are advised to repeat the motion. It is intended that beginners have the opportunity to correct motion errors. Motion repetition can use drill training methods. Drill method is one of the training methods in table tennis that emphasizes repeated exercises continuously to master certain skills. The exercise is repeated step by step until the skill can be mastered thoroughly. The drill method emphasizes the habits gained through repetition of training so that mastery of skills develops and eventually there is good automation of motion. There are three stages that need to be considered in conducting drill exercises, namely the consideration stage, implementation phase, and reflection stage. The advantage of the drill method is that in a relatively short time it can be obtained mastery of the expected skills. This happens because the intensity of the exercise is sufficient and the repetition happens so that beginners master the training material. In addition, drill training

methods can instill habits of discipline in beginners. While the weakness of the drill method is that table tennis beginners lack initiative in training. This happens because beginners must carry out instructions from the trainer, so there is no initiative from beginners. The drill method also has the potential to cause boredom to beginners because of repeated repetition of motion. Coupled with orders from trainers who are poorly understood by beginners, beginners are confused in doing drill training methods. It can also cause boredom from beginners in doing the exercises.

Based on the observations of researchers in the field, the application of drill punch drive exercises did not use tools. The trainer provides many ball and pair drill drill training methods. Both drill training methods can improve beginner drive punch skills. But there is a drawback that beginners need partners in drill training activities. Beginners cannot practice the drill punch drive themselves. On the other hand drill punch drive drills can also be applied using tools such as robots and rebound boards. The equipment is made so that beginners can practice drill punch drives without the help of partners. This research is focused on making the rebound board equipment design used in drill punch drive for table tennis drives for beginners. Equipment design can be categorized as product design. A good product must meet several criteria, namely function, material and user comfort. In the application in the field of sports, a tool must support the performance of device users. An example in table tennis is known as a tool called rebound board that can be used to increase drive punch skills. In its application in the field, the tool should be safe and comfortable to be used by users.

There are several studies that have discussed the study of research and development of table tennis reflection boards. The research has been carried out first and is relevant to the research and development of reflective boards, so that it can be used as a basis for developing reflective board products. The research is Teguh Santosa[1] with the title of the research "Developing a Return Board as an Aid for Forehand Topspin in Table Tennis". This study aims to develop a reflective board tool that can help athletes and coaches improve table tennis forehand topspin skills. Research design uses research and development. The result of this study is that the reflective board as an aid can be used to improve the ability of athletes to apply forehand topspin. This product is found to be 53% effective for beginners and 32% effective for advanced athletes. Reflective board products can be used as a means to practice for juniors, beginners and senior athletes. This product can also be used to motivate athletes in their practice by assessing their ability in table tennis forehand topspin punches.

Khamim Yuniar Firmansyah[2] with the research title "Development of service punch model, forehand push, and backhand push table tennis with a 90˚ reflective board for beginners of junior high school extracurricular members plus Al Kautsar Malang". Research design uses research and development. This study aims to make a variation of the training model in the beginner table tennis practice for extracurricular participants in Al Kautsar Malang Plus Middle School. The sample in this study is 30 participants of the Al Kautsar Malang Plus table tennis extracurricular. The results of this study are (1) Data obtained from small group trials get an average percentage of 88.22%, (2) Data obtained from large group trials get an average percentage of 81.83%, (3) Product development of service punch model, forehand push, and backhand push with pantul board 90˚ is included in the "excellent"

category for use in table tennis extracurricular exercises in Al Kautsar Plus Middle School Malang.

Diki Syafwan Subagja[3] with the research title "The effect of multiball training methods and reflections on the wall on increasing forehand drives in table tennis games at SDN Cisitu and SDN Corenda". Research design uses experimental research. This study aims to determine the effect of multiball training methods and wall training methods in improving the forehand drive technique of table tennis. The sample in this study were 14 students from SDN Cisitu as the experimental group and 15 students from SDN Corenda as the control group. The results of this study were that multiball exercise was more significant for the forehand drive technique compared to ball reflection exercises to the wall. This is based on a different test of two average t-tests (Independent sample t-test) assuming both homogeneous variance (Equel Variance Assumed) with a significance level of $\alpha = 0.05$ obtained a posttest P-value (Sig 2 tail) of 0.035. This shows that the P-value $\leq \alpha = 0.05$, so that the effect of the multiball training method and the reflection on the wall is accepted. Thus the multiball training method and the reflection to the wall are significant to the forehand drive technique of table tennis. But the multiball training method is more significant for the forehand drive technique of table tennis games with an average posttest value of 29.25 compared to the exercise method to the wall which has an average posttest score of 24.67. Tohaya[4] with the title of the research "Efforts to improve the learning outcomes of table tennis through wall media in class V students of SDN 02 Jetak Kidul, Wonopringgo District, Pekalongan Regency". The research design uses classroom action research. This study aims to determine the improvement of the learning outcomes of table tennis in the fifth grade students of SD Negeri 02 Jetak Kidul through the application of modification of learning tools. The sample in this study were students of class V SC Negeri 02 Jetak Kidul, amounting to 21 students, consisting of 9 male students and 12 female students. The results of this study were the learning of table tennis through wall media can improve student learning outcomes of class V SD Negeri 02 Jetak Kidul. This is based on the results of the analysis obtained there was a very significant increase from cycle I and cycle II. Learning outcomes in the first cycle in the complete category were 42.86% and in the second cycle there was an increase in student learning outcomes in the complete category of 80.95%.

2. Literature Review

2.1 Tool Design

Equipment design is included in the product design category. Successful products cannot be separated from the ability of individuals or the design team and the use of product design methods. There are two methods used in product design activities, namely rational methods and creative methods. The rational method is a method that uses a systematic sequence at each stage. The creative method is a method by adding flow of ideas by eliminating mental boundaries that hinder creativity. Equipment is something that is needed and easily moved by the culprit. Good equipment meets several indicators, such as safe, easy to use, attractive, spur to move, according to user needs, in accordance with the objectives, not

easily damaged, and environmentally friendly. A good tool must work according to the expected function.

2.2 Drill Training

Drill training methods can be used to obtain agility, accuracy, and skills. Drill exercises are carried out repeatedly to get skills. Drill practice is an activity to do the same thing repeatedly and earnestly with the aim of perfecting a skill to become permanent. Drill practice is an activity of doing the same thing, repeating it in earnest with the aim of perfecting a skill to become permanent. A distinctive feature of drill training is repeated many times from the same activity. In the implementation, the athlete is first given the apperception of the movement learned before plunging into the field. Then with the direction of the trainer, the athlete carries out training activities repeatedly so that the athlete's skills increase.

2.3 Drive Stroke

A drive punch is a table tennis basic punch technique that beginners must master before practicing other punching techniques in table tennis. The drive punch is categorized as an attack blow in table tennis. Another term for a drive punch is flat shots[5]. The characteristics of the drive punch are fast and can be placed at large angles carried out at close range. The target is the opponent's desk area that is difficult to reach and gives the opponent little time to prepare the return of the ball with good quality. Punch drives according to the way they do it are divided into two, namely forehand drives and backhand drives. The forehand drive is carried out when the opponent's ball is directed to the right side of the body, while the backhand drive is carried when the opponent's ball is directed to the left side of the body. This applies to right-hand bet holders. For bet holders the left hand is the opposite. The blow of the drive by Wang and Chen[5] was divided into two according to the position of the hitter, namely close table shots and off table shots. Close table shots is when the position of the hitter is close to the table, while off table shots are when the position of the hitter is far from the table. The characteristics of close table shots are (1) this punch is more like a flat service punch, (2) this punch is fast and stronger, (3) this punch is often used to restore service and flat blows, (4) this punch is good for placing ball and hit with a wide angle. While the characteristics of off table shots are (1) this blow is more powerful and hard, (2) this punch is used to return the ball from off tablen shots and loop shots from the opponent[5].

2.4 Beginner

Table tennis beginners are people who have just learned about rules, basic techniques, and violations in table tennis. Table tennis starters need intensive training in order to master good table tennis skills including punch techniques and footwork. Beginners are players who learn the basic techniques and rules of table tennis. The purpose of playing beginner table tennis is to try table tennis as a sporting option, wanting to play table tennis with the right

rules, wanting to join a group, using table tennis during exercise. The characteristics of beginner training are training with a trainer, starting training with basic skills, learning basic rules, learning to apply skills and rules in an easy game, practicing drill to improve punch skills, starting the level of exercise intensity[5].

3. Material & Methodology

3.1 Participant

In this study involving 10 beginners of table tennis aged 12-15 years in Sukomoro Table Tennis Club, Magetan Regency as the subject of trials. This research is included in the type of product development using ADDIE development model which consists of 5 stages, namely analysis, design, development, implementation, and evaluation.

3.2 Data Collection Procedure

Data collection techniques using observation, questionnaires, and tests. The data obtained is derived from questionnaires that have been filled out and assessed by experts in table tennis equipment. In addition, data were also obtained from table tennis beginners, namely using different test test techniques between before and after being given a treatment in the form of drill table tennis drive drill exercises with rebound board tools.

3.3 Data Analysis Technique

Data analysis techniques used in this study use quantitative descriptive data analysis. Test results were different between before and after being treated using the Wilcoxon Signed Ranks Test, because the number of trial subjects was less than 30 people. While the questionnaire analysis from table tennis equipment experts used percentage descriptive analysis technique.

4. Results and Discussion

4.1 Assessment of Table Tennis Tools Expert

Data from expert assessment of table tennis equipment was collected from a questionnaire filled by two experts on table tennis equipment. The questionnaire consisted of 8 questions about the rebound board product component with the answer criteria (a) getting a score of 4, the answer (b) getting a score of 3, the answer (c) getting a score of 2, and the answer (d) getting a score of 1.

Table 1. Scores of Table Tennis Equipment Experts

No	Components	Result Score	Max Score	Percentage	Qualification
1.	Rebound board can use for drill training table tennis forehand drive stroke.	8	8	100%	Very Good
2.	Rebound board can use for drill training table tennis backhand drive stroke.	8	8	100%	Very Good
3.	Rebound board made by quality material so not easy to broken.	8	8	100%	Very Good
4.	Rebound board tools can be disassembled so as to facilitate storage and maintenance.	8	8	100%	Very Good
5.	The height of the rebound board is in accordance with the user's height, the table tennis beginner.	8	8	100%	Very Good
6.	The rebound board tool has been equipped with bolts and locks so that it is sturdy and safe to use in drill blow table tennis drive drills.	7	8	87,5%	Very Good
7.	Rebound board tools are equipped with wheels to facilitate the transfer of tools in accordance with the user's needs.	6	8	75%	Good
8.	The rebound board surface can provide good reflective power, making it easier for users to drill table tennis drive.	7	8	87,5%	Very Good
	All Component Rate	60	64	93,75%	Very Good

Based on the percentage data on the components of rebound board assessment by two experts on table tennis equipment, it can be concluded that the overall rebound board component is categorized very well so that the rebound board is very feasible to be applied in drill punch drive for table tennis for beginners.

4.2 Pre Test Differences Test Results and Post Test Punch Drive Beginners Table Tennis Skills

Table 2. Pre Test Score and Post Test Forehand Drive Stroke Beginner

NO.	NAME	PRETEST	POSTEST
1	DIMAS	37	86
2	RIFKI	17	62
3	DIKA	29	77
4	EVENT	33	88
5	ZAIKA	36	86
6	REZA	28	84
7	AWANG	53	98
8	FENDI	52	82
9	ADI	38	83
10	RIKI	32	86

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Postest - Pretest	Negative Ranks	0[a]	.00	.00
	Positive Ranks	10[b]	5.50	55.00
	Ties	0[c]		
	Total	10		

a. Postest < Pretest

b. Postest > Pretest

c. Postest = Pretest

Test Statistics[a]

	Postest - Pretest
Z	-2.810[b]
Asymp. Sig. (2-tailed)	.005

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Sign Test

Frequencies

		N
Postest - Pretest	Negative Differences[a]	0
	Positive Differences[b]	10
	Ties[c]	0
	Total	10

a. Postest < Pretest

b. Postest > Pretest

c. Postest = Pretest

Test Statistics[a]

	Postest - Pretest
Exact Sig. (2-tailed)	.002[b]

a. Sign Test

b. Binomial distribution used.

The results of the analysis of research data about the score of forehand drive with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.810. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. These results indicate that there is a significant difference between the pretest and posttest in the forehand drive. The conclusion is that drill training using rebound boards can improve the forehand punch skills of table tennis beginners.

Sign Test Analysis with a sample of 10 beginners getting exact sig results. (2-tailed) results of the difference test between posttest and pretest get a value of 0.002. With a significance level of 5%, the value of 0.002 <0.05 then H0 is rejected and H1 is accepted which means that there is a significant difference between the pretest and posttest in the forehand drive.

Table 3. Pre Test Score and Post Test Backhand Drive Stroke Beginner

NO.	NAME	PRETEST	POSTEST
1	DIMAS	22	80

2	RIFKI	23	40
3	DIKA	41	55
4	EVENT	43	80
5	ZAIKA	48	76
6	REZA	32	77
7	AWANG	50	88
8	FENDI	48	86
9	ADI	42	77
10	RIKI	37	67

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
Postest2 - Pretest2	Negative Ranks	0[a]	.00	.00
	Positive Ranks	10[b]	5.50	55.00
	Ties	0[c]		
	Total	10		

a. Postest2 < Pretest2

b. Postest2 > Pretest2

c. Postest2 = Pretest2

Test Statistics[a]

	Postest2 - Pretest2
Z	-2.805[b]
Asymp. Sig. (2-tailed)	.005

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Sign Test

Frequencies

		N
Postest2 - Pretest2	Negative Differences[a]	0
	Positive Differences[b]	10
	Ties[c]	0
	Total	10

a. Postest2 < Pretest2

b. Postest2 > Pretest2

c. Postest2 = Pretest2

Test Statistics[a]

	Postest2 - Pretest2
Exact Sig. (2-tailed)	.002[b]

a. Sign Test

b. Binomial distribution used.

The results of the analysis of research data about the score of backhand drive punch with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.805. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. This result shows that there is a significant difference between pretest and posttest in backhand drive. The conclusion is that drill exercises using rebound boards can improve the skills of backhand drive punching the beginners of table tennis.

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4.3 Discussion

Based on the percentage data on the components of rebound board assessment by two experts on table tennis equipment, it can be concluded that the overall rebound board component is categorized very well so that the rebound board is very feasible to be applied in drill punch drive for table tennis for beginners. The results of the analysis of research data about the score of forehand drive with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.810. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. These results indicate that there is a significant difference between the pretest and

posttest in the forehand drive. The conclusion is that drill training using rebound boards can improve the forehand punch skills of table tennis beginners. Sign Test Analysis with a sample of 10 beginners getting exact sig results. (2-tailed) results of the difference test between posttest and pretest get a value of 0.002. With a significance level of 5%, the value of 0.002 <0.05 then H0 is rejected and H1 is accepted which means that there is a significant difference between the pretest and posttest in the forehand drive.

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5 Conclusion

1) Based on the results of the research described in section 4, this research can be summarized as follows. 1) This research is a product development research using ADDIE development model which consists of 5 stages, namely analysis, design, development, implementation, and evaluation. In the analysis phase, the researchers carried out the stages of product needs analysis to table tennis beginners as users, as well as doing theoretical studies and field studies related to problems in the field, namely the low level of skill in table tennis beginner punch which made it difficult for beginners to play table tennis. Then the researchers began to design the product by referring to similar research that had been done before. Next the researcher began to make the initial product based on the product design that had been made. At this stage the product was assessed by the expert on table tennis equipment for further product revisions. Next the researchers applied rebound board products to beginners. Before being applied, the researcher took the pre-test pre-test score. The last stage is that the researcher evaluates in the form of assessing the skill level of the table tennis beginner's punch drive skills by comparing the test scores before and after being given the treatment, namely drill drills, table tennis drive using rebound board.

2) The results of the analysis of research data on the score of forehand drive with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.810. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. These results indicate that there is a significant difference between the pretest and posttest in the

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3) The results of the analysis of research data about the score of backhand drive punch with a sample of 10 people with the analysis of mean rank = 5.5 and sum of ranks = 55.00 and the value of Z = -2.805. Asymp. Sig. (2-tailed) get a value of 0.005 with a significance level of 5% then the value of 0.005 <0.05 then H0 is rejected and H1 is accepted. This result shows that there is a significant difference between pretest and posttest in backhand drive. The conclusion is that drill exercises using rebound boards can improve the skills of backhand drive punching the beginners of table tennis.

References

[1] T. S. and H. Setiono, "Developing Return Board as An Aid for Forehand Topspin in Table Tennis," *J. Educ. Dev. JED*, vol. 5(2), pp. 210–223, 2017.

[2] K. Y. Firmansyah, "Pengembangan Model Latihan Pukulan Servis, Forehand Push dan Backhand Push Tenis Meja dengan Papan Pantul 90° bagi Pemula Peserta Ekstrakurikuler di SMP Plus Al Kautsar Malang," Universitas Negeri Malang, 2013.

[3] D. S. Subagja, "Pengaruh Metode Latihan Multiball dan Pentulan ke Dinding Terhadap Peningkatan Forehand Drive Permainan Tenis Meja," Universitas Pendidikan Indonesia, 2017.

[4] TOHAYA, "Upaya Meningkatkan Hasil Belajar Tenis Meja Melalui Media Dinding Pada Siswa Kelas V SDN 02 Jetakkidul Kecamatan Wonopringgo Kabupaten Pekalongan Tahun Pelajaran 2012/2013," Universitas Negeri Semarang, 2013.

[5] W. Y.-P. and G. Chen, *Table Tennis: Second Edition*. XanEdu Publishing Company, 2006.