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Enhancement Table Tennis Forehand Drive Ability After Exercise Using the Return Board Junior High School Students

Mejora de la capacidad de conducción de derecha en el tenis de mesa después del ejercicio utilizando la tabla de retorno Estudiantes de secundaria

*Teguh Santosa, **Rivan Saghita Pratama, ***Abdul Hafidz, ***Nurhasan, ****Ali MD Nadzalan, *****Singha Tulyakul, ******Nuridin Widya Pranoto, *******Mert Kurnaz, ********Özgür Eken, *********Septyaningrum Putri Purwoto
*Universitas Tunas Pembangunan (Indonesia), **Universitas Negeri Semarang (Indonesia), ***Universitas Negeri Surabaya (Indonesia), ****Universiti Pendidikan Sultan Idris (Malaysia), *****Thaksin University (Thailand), ******Universitas Negeri Padang (Indonesia), *******Haliç University (Turkey), ********Inonu University (Turkey), *********STKIP PGRI Bangkalan (Indonesia)

Resumen. El objetivo de este estudio es evaluar el impacto de la instrucción de manejo de derecha basada en tablero de retorno en estudiantes de secundaria de Central Java en la Clase VIII. Investigación experimental que emplea un diseño de prueba previa y posterior a dos grupos; este estudio consta de una prueba previa al tratamiento y una prueba posterior al tratamiento. Se administraron dieciséis sesiones de entrenamiento de ejercicios de retorno al grupo experimental, mientras que el grupo de control no recibió ninguna intervención. Las pruebas de hipótesis, las pruebas de normalidad y las pruebas de homogeneidad son componentes de las técnicas de análisis de datos. Los hallazgos de este estudio indican que la capacidad de manejo de derecha del grupo experimental mejoró significativamente como resultado del entrenamiento con la tabla de retorno (valor p = 0,000 < 0,05; diferencia de medias = 4,100). Por el contrario, no hubo un impacto discernible de mejorar la capacidad de manejo de derecha en el grupo de control (valor de p = 0,000 < 0,05). Como resultado, se puede concluir que la instrucción utilizando la tabla de devolución puede mejorar significativamente la capacidad de conducción de derecha de los estudiantes de octavo grado de Central Java. Para mejorar la capacidad de ejecutar un golpe de derecha, los investigadores proponen emplear un método de entrenamiento que utiliza la tabla de devolución. Los hallazgos de la investigación antes mencionados sugieren que la instrucción que utiliza el tablero de retorno puede mejorar significativamente la competencia en la conducción de derecha de los estudiantes de grado VIII de la escuela secundaria Central Java. A un nivel de significancia de 0,000, la diferencia de medias es 4,100. Para mejorar las habilidades de conducción de derecha, los investigadores recomiendan seleccionar un método de entrenamiento que incorpore el golpe de retorno como alternativa. Es fundamental que los programas de formación estén bien organizados, estructurados y cumplan con los procedimientos establecidos. Se anima a los académicos que deseen realizar investigaciones adicionales relacionadas con la utilización de juntas de retorno a seleccionar modalidades de capacitación alternativas y yuxtaponerlas.
Palabras clave: Drive de derecha, tenis de mesa, tabla de devolución, estudiantes, entrenamiento.

Abstract. The objective of this study is to assess the impact of return board-based forehand drive instruction on Central Java junior high school students in Class VIII. Experimental research employing a two-group pretest-posttest design, this study consists of a pre-treatment pretest and a post-treatment posttest. Sixteen return drill training sessions were administered to the experimental group, while the control group received no intervention. Hypothesis tests, normality tests, and homogeneity tests are all components of data analysis techniques. The findings of this study indicate that the experimental group's forehand drive ability improved significantly as a result of return board training (p-value = 0.000 < 0.05; mean difference = 4.100). In contrast, there was no discernible impact of enhancing forehand drive ability on the control group (p-value = 0.000 < 0.05). As a result, it can be concluded that instruction utilizing the return board can significantly improve the forehand driving ability of Central Java eighth-graders. To improve one's ability to execute a forehand drive, researchers propose employing a training method that utilizes the return board. The aforementioned research findings suggest that instruction utilizing the return board may significantly enhance the forehand driving proficiency of Central Java Junior High School students in grade VIII. At a significance level of 0.000, the mean difference is 4.100. To improve one's forehand driving abilities, researchers recommend selecting a training method that incorporates the return stroke as an alternative. It is crucial that the training programs are well-organized, structured, and adhere to established procedures. Scholars desiring to undertake additional investigations pertaining to the utilization of return boards are encouraged to select alternative training modalities and juxtapose them.
Keywords: Forehand Drive, Table Tennis, Return Board, Students, Training.

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Teguh Santosa
teguhsantosa@lecture.utp.ac.id

Introduction

Singles and doubles versions of table tennis are played by striking a light ball (Akramjonovich, Abdumalikovich, & …, 2022; Udomvirojsin & Vongsrangsap, 2023; Yamasaki, 2022). The ball game table tennis is compact (Sembiring, Agung Parwata, & Wijaya, 2023; Yu & Gao, 2022). Table tennis has the characteristics of a fast game and fast ball rotation (Huang, Lu, Zeng, Hu, & Xiao, 2021; Z. Zhou & Zhang, 2022). Forehand, backhand, serve, and smash are an example of a technical ability in table tennis (Sanusi, Di Mitri, Limbu, & Klemke, 2021; Zhu et al., 2023). The forehand is a stroke that is often used to make smashes (Suisdareni & Tomoliyus, 2021). In addition, forehand strokes are more powerful than backhand strokes (Rusdiana, 2021). The reason for this is that the backswing requires only strong musculature and does not require the body to intervene. Crucial to table tennis is the precision of

the drive stroke, as it is frequently used to effectively score points during a match (Wafa & Pratama, 2022).

A winning point, which is achieved when the opponent is compelled to sprint in an attempt to reach a ball that is out of reach (open the side court), is the result of hitting accuracy. This function is carried out to conclude a rally or game (Alamsyah & Tomoliyus, 2021). A rally is the fundamental element against which players compete. Perfect strokes are executed by athletes in conjunction with hand and upper and lower extremity movements, coordination, and torso rotation. In conjunction with racket movement and positioning, this is executed in a restricted time frame in an effort to assault the opponent (He et al., 2022).

Table tennis is one of the most popular and important racket sports in the world (He, Lyu, Sun, Baker, & Gu, 2021; X. Yang et al., 2022; Zhu et al., 2023). Particularly at peak levels of performance, table tennis technical prowess is one of the most consequential determinants of a player's standing (Xing et al., 2022). Possessing a high level of technical ability entails the capacity to execute coordinated movements, exert controlled force, and impart sufficient velocity and rotation to the ball (Bańkosz & Winiarski, 2018). Principally influencing the quality of the projectile are the velocity and precision of the ball, in addition to the success rate (He et al., 2023; Kolman, Kramer, Elferink-Gemser, Huijgen, & Visscher, 2019). Competitors must engage in mental and motor training in addition to physical preparation, strategy, and tactics to excel at table tennis (Grycan, Kołodziej, & Bańkosz, 2023; Wong, Lee, & Lam, 2020; Q. Yang, Li, Zhou, & Zhang, 2023). Hitting must be repeatedly practiced by beginning athletes in order to condition their muscle memory to execute automatic movements. This requires consistent mentor feedback and repeated deliberate practice, which is a form of conscious practice (Sanusi et al., 2021).

Table tennis is an instructional component that is incorporated into the school curriculum as part of the physical education (Maxi D. G. Leuwol, Welhelmina Unmehopa, 2023). The objective of incorporating table tennis instruction into school curricula is to impart knowledge and comprehension to students regarding the sport, foster the development of a sportsmanlike demeanor, and cultivate a substantial impact on educational values at large (Wahyudin, Saharullah, & Malik, 2020). The process of introducing learning holds significant importance as it serves to ascertain students' mastery of fundamental techniques, thereby potentially impacting their intrinsic motivation to learn (Purwanto & Suharjana, 2017). Students' enthusiasm for learning can be stimulated through the introduction and planning of learning activities in a targeted manner. When students are motivated to learn, then the execution of learning activities will be seamless (Puspitarini & Hanif, 2019). A skill must be mastered by first conquering the fundamental techniques of the sport (Hidayah et al., 2024; R. S. Pratama et al., 2023; Tambunan, Simatupang, & Suprayitno, 2018). Students are required to master the fundamentals of table tennis (Siregar, Hasibuan, & Ahady, 2022). A coach or teacher is the most suitable motivator due to the fact that the teacher establishes a personal connection with students and serves as a model within the school environment (Shanahan et al., 2023; Wang & Troia, 2023; Zou, Yao, Zhang, & Huang, 2024). Efficient physical education should prioritize the fundamental movement components inherent in the sport (X. Li, 2015). Table tennis is a small ball subject that is covered in junior high school (Wani & Bile, 2022).

Extracurricular and intracurricular activities can both contribute to the improvement of student performance (R. Pratama, Nur'aeni L, & Respati, 2021). The forehand drive is an essential striking technique in table tennis (Pane, Tangkudung, & Sukur, 2021; Pedro, Cabral, & Veloso, 2021). Initial observations conducted by the researcher on students participating in table tennis extracurriculars revealed that the students lacked accuracy with their forehands. Proficiency in this technique is not only imperative for students but also a prerequisite for table tennis participants (Masrun, Alnedral, & Damrah, 2022). The frequency and level of practice have a significant impact on the accuracy of the forehand plunge. For accurate forehand drives, pupils must engage in rigorous practice and utilize programmed (Fauzi, Hanif, & Siregar, 2021; Y. Li et al., 2020).

The return board media is chosen as a tool in the development of sports techniques and technology because its surface is structured, not wavy and can be adjusted in any direction so that the sample can easily practice the basic technique of forehand drive. In the development of sports in Indonesia, of course, there are supporting aspects that make the development of sports increasingly rapid (Firdaus & Mario, 2022; Prabowo, Raibowo, & Rahmi, 2022; Santosa, Pratama, Imron, & Nadzalan, 2024). In relation to the problem to be studied, namely regarding the effectiveness of forehand drives using a return board, this drill is a method that can improve skills in performing forehand drives using a return board (Kurniadi, Saymsuddin, & Razak, 2020; Santosa, 2016). Table tennis requires physical equipment to be able to practice faster and achieve higher achievements, mastery of techniques, tactics or strategies in table tennis (Kondrič, Zagatto, & Sekulić, 2013; Shinkai, Ando, Nonaka, Kizuka, & Ono, 2022; X. Zhou, 2022).

This is anatomy design product return board. We already develop this product and we make a video for this product. Video return board can see in this link https://m.youtube.com/watch?v=PyzQVFQcYPI&pp=ygUEUkJGVA%3D%3D (Santosa et al., 2024). This video explains how this tool works. An explanation of the procedures for how this tool functions has also been explained in the video. The purpose of this tool was developed to help trainers in helping athletes train table tennis stroke speed, especially forehand drives and this tool can help increase the speed of table tennis athletes. Tool specifications:

1. Board width 60 cm and board length 80 cm.
2. The height of the tool is 120 cm according to the height of the opponent's bat position.
3. The slope of the board can be adjusted according to the training needs.

How to use the tool:

1. The equipment is installed with a slope of 70-80 degrees and the distance between the board and the table is 30-40 cm.
2. Athletes stand facing the return bord.
3. Athletes hit a forehand drive towards the pantu target, namely the return bord tool.
4. Athletes do repeatedly until they have good forehand drive skills.

The forehand shot is one of several fundamental playing techniques in table tennis (Asri, Siti, Mukarromah, & Artikel, 2017). An athlete may rely heavily on this shot to accumulate points (Muherman & Ramona, 2019). The primary objective of researchers is to optimize the product return board with the intention of enhancing the forehand strokes of junior high school table tennis players in Central Java.

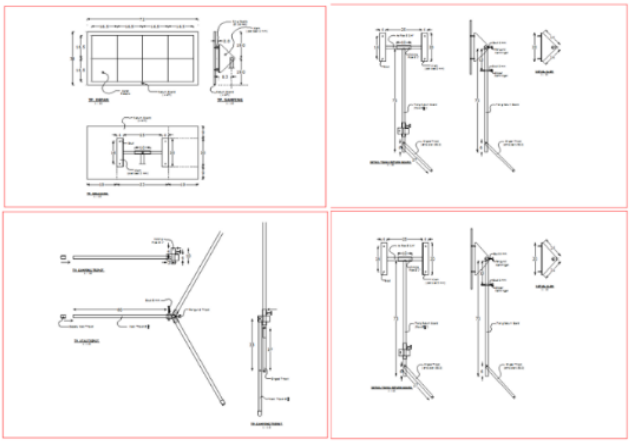

Figure 1. Anatomy Product Return Board

Material & methods

The population comprises all objects and subjects selected by the researcher for the purpose of investigation and derivation of conclusions (Sugiyono, 2011). The purpose of determining the sample is to study the characteristics of the population (Hidayat, 2015). The sampling methodology employed in this study was purposive sampling, in which samples were selected in accordance with specific criteria (Sugiyono, 2011). The researcher employed the following sample selection criteria when determining the research sample: 1) students in the eighth grade; 2) possess knowledge of fundamental table tennis techniques; and 3) be enrolled in table tennis classes at their school. The study incorporated a sample size of 140 eighth-grade students from Central Java.

The method of investigation employed is experimental research. Experimental design research is empirical design research that is utilized to ascertain the extent to which the theoretical premises are supported by reality (Sugiyono, 2019). The research design that was implemented was a "two-group pretest-posttest design", is a research design that employs a pre-treatment pretest and a post-treatment posttest. The experimental group receives sixteen distinct variations of coordination training, while the control group receives general training as outlined in the program, excluding coordination training specifically. By employing this approach, greater precision can be achieved as it enables a comparison with the state of affairs prior to the therapeutic intervention (Sugiyono, 2011). The design of the investigation is as follows:

The instrument used in this research was tests and measurements using a forehand drive ability test instrument (Rihtiana & Tomoliyus, 2014). The reliability of this instrument is 0.96 for junior athletes and 0.95 for beginner athletes, with a validity value of 0.99 (Tomoliyus, n.d.).

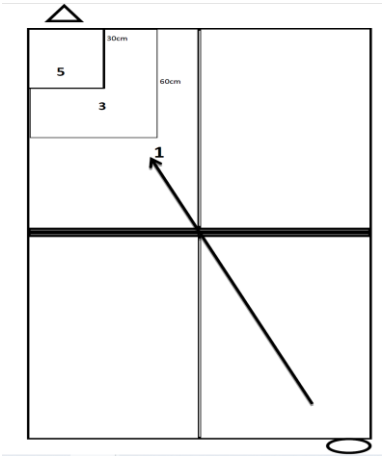

Figure 1. Forehand Drive Stroke Test

Test Instructions

1. The testee exercises and warms up.
2. The first ball starts from the testee.
3. The test subject rallied with two attempts for thirty seconds.
4. The maximum number of scores recorded in thirty seconds.

Data obtained from the total scores of the initial measurements (pretest) and final measurements (posttest) of the forehand drive accuracy test comprise the information gathered for this study. The t-test is utilized in the data analysis method to compare the means of the pretest-posttest scores for the same sample before and after treatment. Prior to conducting the t-test, normality and homogeneity tests are performed. In order to ascertain the normality and homogeneity of the data distribution, tests for normality and homogeneity were conducted.

Results

The present study is designed to be conducted in two distinct groups: a control group and an experimental group,

which will be administered the treatment. The following are the findings of a pre- and post-test study examining the forehand drive skills of junior high school students in Central Java as it relates to table tennis:

Explanation of scientific data

The experimental pretest group achieved the highest score of 114 and the lowest score of 52, as per the data presented above. A deviation of 15.249 units accompanied the mean value of 87.33. The minimum score achieved by the experimental posttest group was 57, while the maximum score achieved was 120. A standard deviation of 15.271 accompanied the mean value of 91.43 points. In contrast, the pretest scores for the control group peaked at 112 and dropped to a minimum of 52. A standard deviation of 15,203 accompanied the mean value of 87.59. The minimum score obtained from the data in the control posttest group was 53, while the maximum score achieved was 114. A standard deviation of 15,299 varied around the mean of 88.16.

Tabl*e* 1.
Description of Data from the Experimental and Control Groups

	Pretest Eksperimen	Postest Eksperimen	Pretest Control	Postest Control
N	70	70	70	70
Mean	87,33	91,43	87,59	88,16
Std. Deviation	15,249	15,271	15,203	15,299
Minimum	52	57	52	53
Maximum	114	120	112	114

Test Prerequisite

Normality Test

The purpose of the normality test is to ascertain whether or not the variables under investigation exhibit a normal distribution. The present study employs the Kolmogorov-Smirnov test to assess the normality of the data. A normal distribution is defined as data in which the p-value is greater than 0.05.

Table 2.
Normality Test

	Kolmogorov-Smirnov[a]		
	Statistic	df	Sig.
Pretest_Experiment	0,097	70	0,100
Postest_Experiment	0,084	70	.200*
Pretest_Control	0,097	70	0,170
Postest_Control	0,097	70	0,099

All experimental and control group data, in addition to the pretest and posttest, contain Sig values, as demonstrated by the data presented above. The data are considered normally distributed if Kolmogorov-Smirnov is greater than 0.05.

Homogeneity Test

The homogeneity test is intended to determine whether the sample variants taken from the population are uniform or not.

The homogeneity value is obtained from the Homogeneity of Variance test. The sample is declared homogeneous if the Sig value. Based on Mean > 0.05. Based on the data above, the Sig value is obtained. Based on Mean 0.998 > 0.05, so it can be concluded that the sample variants are similar or homogeneous.

Table 3.
Homogeneity Test

Test of Homogeneity of Variance				
	Levene Statistic	df1	df2	Sig.
Based on Mean	0,011	3	276	0,998
Based on Median	0,013	3	276	0,998
Based on Median and with adjusted df	0,013	3	275,861	0,998
Based on trimmed mean	0,009	3	276	0,999

Hypothesis testing

The Paired-Samples T Test is utilized for testing, assuming a significant difference between the pretest and posttest results is stipulated if the Sig. (2-tailed) is less than 0.05. Concurrently, if Sig. (2-tailed) is greater than 0.05, then the difference between the pretest and posttest scores is not statistically significant.

Table 4.
Hypothesis Test

	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Pretest Eksperimen	87,33	2,181	-15,72	69	0,000
Postest Eksperimen	91,43				
Pretest Control	87,59	2,476	-1,93	69	0,058
Postest Control	88,16				

The first hypothesis states "There is a significant effect of training using the return bord on improving the forhand drive of class VIII junior high school students in Central Java". Based on the results of the analysis, it shows that the experimental group obtained a p-value = 0.000, so H0 was rejected. The control group showed that p-value = 0.058, so H0 was accepted, meaning that the forehand drive ability in the control group was not significantly different. Thus, it can be concluded that training using the return bord on improving the forhand drive of class VIII junior high school students in Central Java has a significant effect with an increase in the average score of 4.100.

The second hypothesis reads "There is a significant difference between the experimental group given return bord training and the control group in improving the forehand drive ability of class VIII junior high school students in Central Java." Based on table 4, it is known that the mean difference obtained in the experimental group was 4.100, while in the control group it was 0.571 with a mean difference of 3.271, which means that there was a significant difference between the experimental group given return bord training and the control group in increasing the forehand drive ability of class VIII Junior High School students in Central Java.

Discussion

Based on the results of data analysis, it shows that there is a significant effect of training using the return bord on improving the forhand drive of class VIII Junior High School students in Central Java. Through training carried out during 16 meetings, it has been proven that it can improve

students' forehand stroke ability with p-value = 0.000 < 0.05 and a mean difference of 4.100. Meanwhile, in the control group there was no effect of increasing forehand drive ability, p-value = 0.000 < 0.05. These results were obtained from comparing pretest data before treatment and posttest data after treatment.

One of the most key shots in table tennis is the forehand drive (Agus Kurniadi, Hernawan, & Sri Nuraini, 2023; Lanzoni et al., 2021; Muherman & Ramona, 2019). Athletes must engage in consistently and repetitive practice in order to master proper fundamental techniques. Students are required to comprehend and apply fundamental table tennis techniques using learning strategies that are individualized to each student (Saputra & Subhan, 2019). Fundamental table tennis techniques are an athlete's starting capital; therefore, in order to develop a talent for sports, a player must truly master these techniques (Lee et al., 2021; Mukaromah, Hadi, & Nurdin, 2020; Nadzalan et al., 2021). Mastery of an athletic ability is not attained easily; rather, it necessitates a systematic learning process (Lola & Tzetzis, 2021).

Mastery of fundamental skills is the foundation for mastery of any sport (Kristiyanto, 2011; Maulidin, Syah, & Primayanti, 2020). A table tennis player should prioritize the acquisition and mastery of the forehand drive technique (Babar et al., 2021). Development and frequency of practice have a significant impact on the precision of the forehand drive (Nurdin & Aminullah, 2020). In terms of the frequency of the exercise, it can be concluded that programmed and consistent exercise, then improves the skills of the forehand stroke (Sinulingga & Nova, 2021). That is, in order to be able to improve good forehand drive skills, students must practice intensively and programmed (Tyan, 2021). The training program should be structured and planned according to the training portion and individual characteristics (Bülbül, 2020; Kinnerk, Kearney, Harvey, & Lyons, 2023).

The educational curriculum is a part of the development and development of sports talents (Sulistiyono, S. Suherman, & Kurnianto, 2019; Xiang, Tengku Kamalden, Liu, & Ismail, 2022; Xuanchen, 2022). As a means of identifying, observing, developing, and selecting talents to find potential athletes (Ashford, Burke, Barrell, Abraham, & Poolton, 2020). School physics education should gradually strengthen selectivity and further increase students' interest in participating in sports (An, Yang, Niu, & Wang, 2022). Skill is not only about developing the right technique, but also about experience (Breivik, 2016). Talent development in sports requires long, systematic, targeted, and continuous training according to the player's sport to optimal performance. This process should be supervised by an experienced and qualified trainer (Ford et al., 2020).

Training is a network of physical activities, techniques, tactics, and psychology (Liu, Li, & Rochester, 2022; Rodríguez Macías, Giménez Fuentes-Guerra, & Abad Robles, 2022, 2023). Training activities carried out by athletes must be organized under the guidance of coaches to develop athletic skills and improve athlete performance (Otte, Millar, & Klatt, 2019). So, by doing the exercise using the return board programmed will improve the student's forehand skills. Varied training can create a pleasant exercise atmosphere for athletes so that they do not feel full during training and the athlete will be enthusiastic in training (Hidayat Suharto et al., 2024). The variation of the return board exercise is expected to enhance the ability of the student to forehande drive because this method gives the student the opportunity to hit the ball at a speed, direction, and angle of the ball that is almost the same. Furthermore, the method of return board training gives the benefit to the student of getting used to doing forehand drive to the target and the student can apply the accuracy of the forehands drive into the real surface using this return board media.

Conclusions

The results of the study indicate that learning using a return board can significantly improve the forehand drive ability of junior high school students in grade VIII in Central Java. At a significance level of 0.000, the average difference is 4.100. To improve forehand drive ability, researchers suggest choosing a training method using a return board as a tool to improve forehand drive stroke performance. The return board can be used as a training medium that supports improving the performance of athletes in large numbers. Researchers who want to conduct further research related to the use of the return board are advised to choose alternative training methods and compare them.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Datos de los/as autores/as y traductor/a:

Teguh Santosa	teguhsantosa@lecture.utp.ac.id	Autor/a
Rivan Saghita Pratama	rivan.saghita.pratama@mail.unnes.ac.id	Autor/a
Abdul Hafidz	abdulhafidz@unesa.ac.id	Autor/a
Nurhasan	nurhasan007@unesa.ac.id	Autor/a
Ali MD Nadzalan	ali.nadzalan@fsskj.upsi.edu.my	Autor/a
Singha Tulyakul	singha@tsu.ac.th	Autor/a
Nuridin Widya Pranoto	nuridin@fik.unp.ac.id	Autor/a
Mert Kurnaz	mertkurnaz@halic.edu.tr	Autor/a
Özgür Eken	ozgureken86@gmail.com	Autor/a
Septyaningrum Putri Purwoto	septyaningrum@stkippgri-bkl.ac.id	Autor/a
Ihwan Firmansyah	ihwan@stkippgri-bkl.ac.id	Traductor/a