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The Effect of New Spin Wheel Training on Improving Service Technique Skills in The Table Tennis Student Activity Unit

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Keywords

New Spin Wheel;
Table Tennis Service;
Technique Trainning

Abstract

This technique is crucial, but problems arise from insufficient rotation speed, which affects accuracy. In reality, many beginner table tennis players and UKM members still experience difficulties in producing consistent serves, especially with variations in spin and precise ball placement. Observations during the UKM training program indicate that many students struggle to control the ball's direction, vary its spin, and maintain consistency in their service strokes. This research design uses a quasi-experimental type of research, design the Non-Equivalent Control Design Group is the most frequently used design in social research. This design is where the experimental group is influenced by a particular variable by involving a non-randomly selected control group, measured before and after the intervention. The sample used in this study consisted of 22, the experimental and control groups were divided equally, with 11 participants per variable class. The results of the analysis of covariance (ANCOVA) showed that the covariate variable (pretest) had a significant effect on the posttest score, F (1,39) 8.224 p 0.007. After controlling for the influence of the pretest score, the posttest score experienced a significant difference, F (3,39) 13.605 p 0.001 partial N2 0.511. However, from an inferential perspective, the statistical analysis showed no significant difference between the experimental and control groups (p0.05). This indicates that the effectiveness of the New Spin Wheel method has not been proven strongly at the 5% significance level. This insignificance may be influenced by several methodological factors, including the relatively small sample size, differences in initial ability levels between the groups, and limited control of variables in a quasi-experimental design.

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INTRODUCTION

Table tennis is a type of racket sport that demands technical precision, eye-hand coordination, reaction speed, and the ability to make decisions quickly (Sukadiyanto, & Muluk, 2019). This sport is known for being highly dynamic, competitive, and requiring high levels of concentration. It is played in a relatively small area with simple equipment (Winarno, 2020). The most frequently used indicators in racket sports, including table tennis, describe the equipment in strokes that are common to all net and wall games, such as the type of stroke and the number of strokes produced in a rally or unit of time, and provide data (Safari et al., 2022). Table tennis is a fun game, but the complex structure of the game makes it one of the most challenging games (Farid et al., 2019).

One of the main skills that determines success in table tennis is the service technique. In table tennis, a serve is the first way to hit the ball in play by bouncing the ball onto the server's table, over the net, and finally bouncing onto the opponent's table, Rizal, RM, & Rusmana, (2020). This technique is the initial determinant of how an athlete will play, meaning a point is earned based on the first hit, which determines accuracy and success. In practice, mastery of this technique is greatly influenced by hand coordination, racket angle, swing speed, and an understanding of the resulting spin on the ball, Schmidt, RA, & Lee. (2019). Throughout history, table tennis has undergone many changes. The game has become faster, points have become more rapid, and shots have become more powerful and precise. Therefore, it plays a very strategic role in the game. Accuracy and good spin variation can help a player initiate the first attack or even win an outright point.

In practice, a good and correct service is executed when the ball is tossed approximately 16 cm high, and the bounce occurs on the server's table and then on the opponent's table in a diagonal shape, Jannah, M., et.al, (2023). One of the most important techniques is the service, which is used to serve the first ball in the game Srinivasan (2014), examined the effect of special technique training on punching accuracy, while Kovacs, S., Takacs, B., & Toth (2019) tested the use of a training robot to increase spin on the forehand loop-drive. The two researchers focused solely on deepening their study of the spin generated by the technique under study, without specifically explaining the specific training. The training referred to the use of the equipment used to administer the treatment in the study.

This technique is crucial, but problems arise from insufficient rotation speed, which affects accuracy. In practice, SMEs focus less on achievement and more on leisure activities, which are less rigid and more flexible. This is in line with theory Weinberg, RS, & Gould, (2019). In reality, many beginner table tennis players and UKM members still experience difficulties in producing consistent serves, especially with variations in spin (such as backspin, topspin, and sidespin) and precise ball placement. This difficulty is seen in the lack of accuracy and the ability to create spin variations that allow the opponent to control the rally or easily return the ball. The results obtained will be optimal when players must have complex technical and tactical abilities because a player's success depends not only on their physical strength, but also on the ability to control the ball and understand their opponent's movements.

However, the ability to provide good service is still considered low in the court, especially among athletes in the Table Tennis Student Activity Unit (UKM). Observations during the UKM training program indicate that many students struggle to control the ball's direction, vary its spin, and maintain consistency in their service strokes, according to Bompa, TO, & Haff, (2019a). Training is a systematic procedure carried out repeatedly to improve the mental, technical, tactical, and physical abilities of athletes. Players alternate and repeatedly hit the ball on a relatively small table to control the movement, speed, and placement of the ball so that it is difficult for the opponent to return successfully, as suggested in previous research by Azis et al. (2019). Without the use of clear visual feedback or equipment, practice is often repetitive (drill). However, mastery of service technique is greatly influenced by the ability to coordinate hand movements, racket angle, swing speed, and an understanding of the resulting spin on the ball (Schmidt, RA, & Lee, 2019).

In motor theory in practice, players can recognize mistakes and correct them through adjustments. Exercises that provide direct feedback are needed in motor learning theory to improve technical skills such as service, Magill, R.A., & Anderson (2021). The New Spin Wheel

technique trains hand and wrist coordination and mastery of the service rhythm. Experiments with supporting equipment such as the New Spin Wheel, Robopong, and Multiball have shown that the New Spin Wheel is often used to train spin mastery and stroke consistency in students and college athletes. Therefore, this method can be a useful training tool for improving players' service skills; this is especially true for spin variation, accuracy, and deception, which is the disguise of the direction and effect of the ball (Gossard, TR, et. al, 2023).

Although the New Spin Wheel exercise has become increasingly popular in training practices, there is still little scientific research specifically investigating its impact on players' table tennis serving skills. To develop a precise, data-driven training program, empirical evidence is needed to demonstrate the technique's impact on players' serving abilities. Furthermore, this exercise provides immediate visual feedback that helps players understand the effects of the ball's rotation resulting from their movements, thus accelerating motor adaptation. In the context of UKM students, the use of the New Spin Wheel is important because it can be used independently without requiring constant coach supervision, making it efficient for coaching on campus.

In general, training programs are used to provide good service skills, namely through the ability to practice, which is why it is important to have new innovations that provide the impression of training with a varied program. According to (Sariul, et al., 2022). If a table tennis player has mastered the service stroke, both in mastering various types of service stroke techniques such as forehand topspin, backhand topspin, forehand backspin, or backhand backspin, and mastering the accuracy or placement of the ball's fall, then the player will effectively succeed in achieving the goal of the service itself. As prospective educators and sports coaches, students need to have good basic technical skills in order to participate in competitions or become drivers of sports activities in the community.

However, research specifically examining the effect of New Spin Wheel training on service skills, particularly among student members of student tennis clubs (UKM), is still very limited. Through New Spin Wheel training, students can improve service quality, enhance motor coordination, and gain a practical understanding of spin variations, which are important elements in table tennis strategy. New Spin Wheel training is a type of equipment-based training aimed at improving players' ability to generate spin in table tennis, control the direction of the ball, and maintain body balance when serving (EmRatThich., 2023). This tool is part of the technique improvement training in table tennis, referring to the technique of producing complex and circular spin on the ball, usually used in serves or topspin shots.

There are not many scientific studies examining the use of this simple tool in the context of engineering learning and training in higher education. The few relevant studies focus solely on the observed techniques, without specifically addressing similar training programs. For example, research conducted by Mu'ammar, (2017). To achieve a precise serve that is difficult for the opponent to receive, the right method is required. Using the right method for beginner table tennis athletes in serving will facilitate the training process and achieve the desired results. Research conducted by Ratanapanadda (2025), in Thailand that with a travel distance of only 0.2 to 0.4 seconds to see the approaching ball, the opponent has little time to react and prepare, there are research results that show that the use of equipment in the form of an automatic ball machine and balls thrown by an efficient coach helps develop reaction time in just 4 weeks (Ratanapanadda, 2025). Besides that, Grycan et al., (2025) in Poland researched that the number of points scored directly with service was dominated by backhand push, and attack dominated the number of points scored with returns (Grycan et al., 2025).

Essentially, the technique that needs to be considered is how the ball in the opponent's area cannot be returned, or the attack on the ball is too fast, resulting in the opponent being unable to return the ball. Therefore, this study seeks to fill this research gap by conducting an empirical test of the effectiveness of the New Spin Wheel exercise in improving the service technique skills of UKM Table Tennis students. This research is important because it attempts to provide an effective and efficient training method at various levels in the field of Table Tennis. With the hope that it can help coaches, teachers, and athletes in developing their skills or abilities through innovative training programs.

This research can be categorized as a novel problem because it emphasizes contextual and implementation aspects rather than the development of new theories. This research is novel in two main aspects. First, in terms of training methodology, this study introduces the New Spin Wheel as a simple yet innovative tool for training motor coordination and spin control during service. It was conducted on students from the table tennis Student Activity Unit (UKM), which differs from previous research subjects, such as school students and professional athletes. Second, in terms of research context, the research focused on a group that has not received much treatment in scientific studies, so the results can serve as a basis for developing an applicable training model in higher education environments. Using the New Spin Wheel, players can learn to read variations in ball spin, understand the effects of spin that occurs after the bounce, and regulate wrist movements during service.

The novelty of this research lies not in a new theory, but rather in its contextual aspects and implementation. This research was conducted on students from the table tennis Student Activity Unit (UKM). Initial findings from the real-world situation in the table tennis Student Activity Unit (UKM), where service technique training is unstructured and poorly implemented, are presented. Training is a systematic process to improve physical quality and aims to improve sports performance (Asri, 2020). Due to academic demands and varying skill levels, UKM students have limited time for practice, resulting in training often being ineffective in consistently improving service quality. Because a serve that is executed harder, sharper, and more deceptively will have a greater chance of getting a point or winning a point (Hasmarita & Kurnia, 2020). To improve your hitting technique when playing table tennis, adequate practice is crucial. The most important thing is to understand the basic techniques of table tennis.

Furthermore, the methods and media used for training are still conventional and lack tools that can improve accuracy and spin variation. A training approach is needed that is not only easy to use but also adapts to the characteristics of UKM students, as these conditions indicate a discrepancy between the need for effective training and the practice of training conducted in the field. According to (Endie Riyoko, 2019), if it's not accompanied by the intensity, quality, and intensity of the exercise itself, intensive training isn't sufficient. Variation in training can influence and is crucial for avoiding boredom and fatigue.

This study contributes to empirical research on sports development in higher education settings. This research update includes practical implementation aspects; for example, a training method for improving table tennis serving skills using the New Spin Wheel. To meet the needs and conditions of UKM students, the training program was systematically designed over several sessions and tailored to their needs. The results showed that this improvement was not significant.

Furthermore, this method provides a general overview that can be directly applied by coaches, SME trainers, and sports practitioners in developing effective and efficient training programs. Therefore, this study does not claim theoretical novelty. Instead, it emphasizes the practical and tangible benefits of applying the training method in specific contexts and real-world situations. These findings will form the basis for recommendations for practical training methods for coaches and instructors of table tennis student activity units on campus, if proven effective. Therefore, this research is expected to provide theoretical contributions to the development of sports training science and practical contributions to improving student achievement, as well as being part of recommendations for training programs to improve tennis skills.

METHODS

The research method used in this research is quantitative research, which is a type of research with systematic specification, planned and clearly structured from the beginning until the research design is implemented (Fortunately, 2018). In this study, there are figures in various aspects of the research conducted, starting from data collection, data interpretation, and the results of the research conducted. Auliya et al. (2020) emphasize that the presentation of data obtained in quantitative research is usually in the form of figures, tables, graphs, and so on. Quantitative research is used for inferential research, which is used to test a hypothesis in the research being conducted.

This research design uses a quasi-experimental type of research, chosen because it allows for testing of causal relationships in the real world without full randomization of research subjects. The difficulty of controlling other variables in social research, especially in the context of classroom research, led to the birth of Quasi-Experiments. Educational practices with students in the classroom or outdoors require strict control, and situations in which students interact with each other and with their environment (Abraham & Supriyati, 2022). These studies differ from true experiments because they do not have complete control over all variables or cannot use complete randomization. As a result, these studies are usually conducted in settings that do not allow for randomization, such as educational, social, or public health settings (Anantasia & Rindrayani, 2025).

The Non-Equivalent Control Design Group is the most frequently used design in social research. This design is where the experimental group is influenced by a particular variable by involving a non-randomly selected control group, measured before and after the intervention. This nonequivalent control group design is called a no-treatment control group design with a pretest and posttest (Abraham & Supriyati, 2022). This research aims to find techniques that can significantly improve service accuracy.

The sample determination used in this study uses the purposive sampling method. According to Sugiyono (2019), explains that the purposive sampling technique is sampling using certain considerations according to the desired criteria to determine the number of samples to be studied. The sample used in this study consisted of 22 members of the Table Tennis Student Activity Unit (UKM) at UPI Sumedang. The sampling criteria were based on specific characteristics and were equivalent to the required criteria. The experimental and control groups were divided equally, with 11 participants per variable class. In this study, it is important to consider the reliability and validity of the results obtained from the sampling technique used, especially in a non-probability context (Subhaktiyasa, 2024). The sample criteria used in this study consist of inclusion criteria and exclusion criteria.

This study uses forehand and backhand service instruments adapted from research (Kurniawan et al., 2023), which conducted validity tests for small and large-scale forehand and backhand services. In the small-scale validity test, 10 trials were conducted on 20 samples, where the results obtained r count > r table, so it can be concluded that the instrument is valid. Next, validation was carried out on a large scale with 10 trials carried out by 100 samples, with the results of r count > r table, which means it can be concluded that the instrument is valid. After the validity test was carried out, the next step was to conduct a reliability test. The reliability test was carried out on a large and small scale. The reliability test for the accuracy of small-scale forehand and backhand services was carried out on 20 samples with 10 trials per sample. The results for the forehand were the Cronbach's alpha value > r coefficient, namely 0.715 > 0.60, and for the backhand, Cronbach's alpha > r coefficient, namely 0.770 > 0.60, which means the data is reliable. Next, a large-scale reliability test was conducted on 100 samples of forehand and backhand services, with 10 trials per sample. The results for the forehand service showed a Cronbach's alpha value > r coefficient, namely 0.601 > 0.60, and for the backhand service, the Cronbach's alpha value > r coefficient, namely 0.665 > 0.60. It can be concluded that the data is reliable.

An instrument is considered valid only if it has the ability to measure the intended dimensions and produce results in accordance with the research objectives (Taherdoost, H., & Hamta, 2017). Based on this opinion, it is possible to collect the data needed for this study

objectively through research measurements, namely numbers that can be processed statistically.

The The research instrument used a table tennis service technique skills test that measures the accuracy and consistency of the service. The study was conducted through a pre-test, treatment sessions over several sessions, and a post-test. Data analysis included:

1) Data Description
   a. Pretest Table (experimental and control)
   b. Posttest Table (experimental and control)
2) Prerequisite Test
   a. Normality Test
   b. Homogeneity Test
3) Hypothesis Test
   a. Paired T-Test for the Experimental Group
   b. Paired T-Test for the Control Group
   c. Group Difference Test (ANCOVA)
   d. Group Difference Test (N-Gain)
   e. Measurement Test (R-Square)

RESULTS AND DISCUSSION

Based on the results of the research conducted, the procedures were followed. The research procedure began with observation, drafting a writing framework, pretesting, treatment, and ended with a posttest. The problem served as one of the initial benchmarks for the research. Observations were conducted to assess the extent of the problems occurring in the field. The results of the research examined the effectiveness of training with the New Spin Wheel on service technique skills in table tennis.

DATA DESCRIPTION

Based on the results of descriptive statistical analysis, the number of samples in each group, both the experimental group and the control group, was 11 participants (N = 11). The results of the descriptive statistical analysis showed that the new spin wheel training tended to improve table tennis service technique skills in the experimental group.

Table 1. Description of table

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance
Pre-Test Eksperimen Backhand	11	15	26	230	20.91	3.700	13.691
Pre-Test Eksperimen Forehand	11	15	22	207	18.82	2.750	7.564
Post-Test Eksperimen Backhand	11	27	35	339	30.82	3.060	9.364
Post-Test Eksperimen Forehand	11	31	45	405	36.82	4.285	18.364
Pre-Test Kontrol Backhand	11	11	20	28	262	23.82	2.960
Pre-Test Kontrol Forehand	11	11	21	28	277	25.18	2.040
Post-Test Kontrol Backhand	11	28	40	385	35.00	4.050	16.400
Post-Test Kontrol Forehand	11	11	28	40	385	35.00	4.050
Valid N (Listwise)	11						

Before treatment (pre-test), the average service ability for the backhand technique was 20.91, and for the forehand was 18.82, indicating that the initial ability was at a moderate level with relatively homogeneous data variations. After treatment, the average value increased to

30.82 for the backhand and 36.82 for the forehand, indicating a significant increase in accuracy and control of the ball spin. From the results of the prerequisite tests carried out in this study, normality and homogeneity tests for the two types of research groups.

PREREQUISITE TEST

The interpretation of the results of these descriptive statistics then involves testing the prerequisite tests.

a) Normality Test

Normality tests were performed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Given that the sample size was less than 30 (N < 30), the primary interpretation was based on the Shapiro-Wilk significance value.

Table 2. Test of Normality

		Kolmogorov-Sminornov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
Exercise Result	Pre-Test FR (control)	.201	11	.200*	.947	11	.611
	Pos-Test BC (control)	.193	11	.200*	.905	11	.212
	Pos-Test FR (control)	.235	11	.092	.906	11	.216
	Pos-Test BC (control)	.183	11	.200*	.900	11	.185
	Pre-Test FR (eksperiment)	.241	11	.074	.879	11	.101
	Pre-Test BC (eksperiment)	.169	11	.200*	.936	11	.474
	Post-Test FR (eksperimena)	.119	11	.200*	.968	11	.864
	Post-test BC (eksperiment)	.185	11	.200*	.881	11	.107

*. This is a lower bound of the true significance

a. Liliefors Significance Correction

The test results show that all groups have a significance value (Sig.) greater than 0.05. All research data show a significance value (Sig.) greater than 0.05 in both the control and experimental groups. For the forehand pre-test, the significance values were 0.611 for the backhand pre-test, 0.212 for the forehand pre-test, and 0.185 for the backhand post-test, respectively. For the experimental group, the significance values were 0.216 for the forehand post-test and 0.185 for the backhand post-test, respectively.

b) Homogeneity Test

With the statistical value using Levene's test referring to the mean value of the results of1.538 and a significance value (Sig.) of 0.219, the results show that the significance value is greater than the significance level used, which is 0.05 (p = 0.219 is greater than 0.05). Therefore, it can be concluded that there is no significant difference in variance between the tested groups.

This indicates that the data have homogeneous or equal variance between groups, proving the assumption of parametric statistical analysis about homogeneity of variance. Thus, the fulfillment of this assumption applies to continue the statistical test of homogeneity on other conditions, namely the paired test for the experimental group and the control group.

Table 3. Test of Homogenity of Variance

		Lavene Statistic	df1	df2	Sig.
Exercise Results New Spin Wheel	Based on Mean	1.538	3	40	.219
	Based on Median	.933	3	40	.434
	Based on Median and with adjusted df	.933	3	29.523	.437
	Based on trimmed mean	1.526	3	40	.223

Fulfillment of this homogeneity assumption indicates that the data meet one of the essential requirements for parametric statistical analysis. Therefore, the analysis can proceed to the hypothesis testing stage using parametric statistical techniques such as paired-sample t-tests and independent-sample t-tests to determine differences between groups.

HYPOTHESIS TESTING

A. Parametric Comparative

Table 4. Independent Sample T-Test Service Forehand

	Class	N	Mean	Std. Deviation	Std. Error Mean
Results	Posttest F (kontrol)	11	35.00	4.050	1.221
	Posttest F (eks)	11	36.82	4.285	1.292

		Levene's Tes for Equality of Variances		t-test for Equality			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differences
Hasil	Equal variances assumed	.044	.835	-1.023	20	.319	-1.818
	Equal variances not assumed			-1.023	19.936	.319	-1.818

Table 5. Independent Sample T-Test Service Backhand

	Class	N	Mean	Std. Deviation	Std. Error Mean
Results	Posttest F (Control)	11	29.91	2.625	.791
	Posttest F (eks)	11	30.82	3.060	.923

		Levene's Tes for Equality of Variances		t-test for Equality			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Differences
Hasil	Equal variances assumed	1.677	.210	-.748	20	.463	.463
	Equal variances not assumed				19.548	-.909	-.909

The results of the t-test analysis on independent samples showed that there was no significant difference in serving ability between the experimental and control groups after the treatment was administered. For forehand serve skills, the significance value obtained was 0.319 ($p > 0.05$), while for backhand serve skills the value was 0.463 ($p > 0.05$).

These findings indicate that although the average score of the experimental group was higher than the control group in both types of serve, the difference did not reach the level of statistical significance. This indicates that the intervention carried out on the experimental group was as effective as the method used on the control group in improving the serving performance of athletes or students during this study period.

B. Paired Test experimental group

In the experimental group, a sample t-test was conducted to determine whether there was a significant difference between the pre-test and post-test scores after the new spin wheel training treatment was administered. The hypotheses used were H0 and H1.

Table 6. Paired Samples Test Experiment

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. D	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest FR – Postest FR	-18.000	3.066	.924	-20.060	-15.940	-19.472	10	.000
Pair 2	Pretest BC – Postest BC	-9.909	2.737	.825	-11.748	-8.070	-12.008	10	.000

The resulting output indicates that the null hypothesis (H_0) is rejected because both pairs of variables have a significance value of 0.000 ($p < 0.05$). This indicates a statistically significant difference in the means between the pre-test and post-test scores in the experimental group. Post-test scores were consistently higher than pre-test scores, as indicated by the negative mean difference values, namely -18.000 for the forehand (FR) variable and -9.909 for the backhand (BC) variable. The negative sign indicates the direction of the difference, where ability improved after the treatment.

The results of the paired test for the experimental group where this study shows a significant difference between the pretest and posttest scores of the experimental group. The decrease in the average value indicated by the negative number in the mean difference (FR = - 18.000; BC = -9.909) indicates that the post-test score is always higher than the pre-test score. From a theoretical perspective, this finding indicates that the action or treatment given to the experimental group has a significant effect on improving the FR and BC variables. The 95% confidence interval that does not include the number zero strengthens the validity of this finding, confirming that the difference is not the result of chance.

C. Group Difference Test Analysis of Covariation (ANCOVA)

Table 7. Analysis Covarians

Source	Type III Sum of Squares	Df	Means Square	F	Sig.	Partial Eta Squared
Corrected Model	449.851a	4	112.463	10.410	.000	.516
Intercept	325.831	1	325.831	30.160	.000	.436
Pretest	88.851	1	88.851	8.224	.007	.174
Model_Latihan	440.933	3	146.978	13.605	.000	.511
Error	421.331	39	10.803			
Total	49184.000	44				
Corrected Total	871.182	43				

The results of the analysis of covariance (ANCOVA) showed that the covariate variable (pretest) had a significant effect on the posttest score, $F(1,39) = 8.224$; $p = 0.007$. After controlling for the influence of the pretest score, the posttest score experienced a significant difference, $F(3,39) = 13.605$; $p < 0.001$; partial $N^2 = 0.511$. The results showed that the type of treatment (Training Model) effectively influenced the subjects' achievement differently, regardless of their differences in initial abilities. The Training Model had a large effect size in explaining changes in the dependent variable, as indicated by the partial eta squared value of 0.511.

D. Testing the Effectiveness of Measurement Methods (N-Gain)

Table 8. N-Gain Score and N-Gain Percen.

Backhand	N	Minimun	Maximum	Mean	Std. Deviation
NGain_ScoreBC	11	.22	.46	.3394	.07943
NGain_PersenBC	11	22.22	46.43	33.9358	7.94325
Valid N (listwise)	11				

Forehand	N	Minimun	Maximum	Mean	Std. Deviation
NGain_ScoreFR	11	.42	.82	.5823	.11832
NGain_PersenFR	11	41.94	82.14	58.2297	11.83184
Valid N (listwise)	11				

The results of the N-Gain analysis, calculated using scores and percentages for the experimental and control groups, showed varying levels of improvement in service technique skills for each type of stroke. The N-Gain value for the backhand serve was moderate, ranging between 0.3 and 0.7, but was considered less effective in terms of interpretation. This indicates that although skills improved after treatment, the improvement was not optimal in enhancing backhand technique performance.

Furthermore, the N-Gain value for the forehand serve was 0.5, which is also in the moderate category, but quite effective. These results indicate that treatment can improve forehand technique compared to backhand, in terms of movement quality and final serve results. This improvement can be understood as the result of a structured and repeated training process, as stated by Magill, Richard A., (2017) that consistent and specific training on skills will gradually increase mastery of motor techniques.

Overall, the findings of this N-Gain analysis indicate that, although with varying degrees of effectiveness, training improves skills in both types of serves. Compared to the backhand, improvement in forehand technique tends to be more effective. Therefore, it can be concluded that training has a greater impact on mastering forehand technique in table tennis.

E. R-Square Test

Table 9. R-Squre for Backhand and Forehand

Model Summary BC				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.311a	.096	.051	3.500
a. Predictors: (Constant), Postest Backhand				

Model Summary FR				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.085a	.007	-.041	4.108
a. Predictors: (Constant), Postest Forehand				

According to the Model Summary BC table, the coefficient of determination (R-squared) is 0.096. This indicates that 9.6% of the variance in the backhand serve variable can be explained by the independent variable, or predictor. Other factors not included in this research model accounted for 90.4% of the variance. This increase in value indicates that the variable's contribution to backhand serve ability is still relatively small, although it does have an influence.

The R Square value of (0.007) was found based on the Model Summary FR table. As these figures indicate, the independent variable only contributes 0.7% to the variance in the forehand serve variable, indicating that other variables not included in this analysis influence forehand serve ability almost completely (99.3%). The R^2 value is used to assess the extent to which the model can explain the variation in the dependent variable.

Ghozali (2018) stated that a low coefficient of determination value indicates that the independent variables have limited ability to explain the variation in the dependent variable. On the other hand, a value close to one indicates that the independent variables almost completely provide the information needed to predict the variation of the dependent variable. In

the realm of sports or psychomotor skills, low R^2 values often occur because athlete performance is influenced by a variety of complex internal and external factors (such as physical, mental, and environmental conditions) that cannot be explained by just one or two predictor variables.

The results indicate that the experimental group's table tennis serving skills significantly improved as a result of the training provided, in this case, the new spin wheel method. The improvements were tested inferentially and descriptively. Therefore, it can be concluded that the treatment improved technical performance in both the forehand and backhand. Therefore, the findings of this study support the notion that sports learning can significantly improve motor skills through organized and specific training interventions.

This study aimed to analyze the effect of New Spin Wheel training on improving table tennis service skills compared to conventional training methods. Descriptive analysis results showed that both groups experienced improved scores after treatment, but the improvement in the experimental group was greater than in the control group. Theoretically, the improvements in both groups align with the basic principles of sports training. Bompa, T.O., & Buzzichelli (2019), stated that improved performance results from systematic and repeated training based on the principles of specificity and repetition. Both groups in this study received structured service technique training, resulting in neuromuscular adaptations that improved accuracy and ball control.

Furthermore, from a motor learning perspective, Schmidt, RA, & Lee (2019) explain that motor skills develop through repeated practice enriched with a variety of training conditions. Training using the New Spin Wheel provides a more dynamic variation in the direction and rotation of the ball compared to conventional methods. This variation contributes to strengthening the motor schema (schema theory) and thus results in greater improvement in the experimental group. However, the insignificant difference between groups can be explained by several factors. First, the relatively small sample size (N = 11 per group) potentially reduces the statistical power of the test. Second, there was a difference in initial scores between the experimental and control groups, where the control group had a higher pre-test score. In a quasi-experimental design, control over external variables is not fully possible. Fraenkel, J.R., Wallen, N.E., & Hyun (2019), so that the initial conditions of the subject can influence the final results.

CONCLUSION

The This study examined the effect of New Spin Wheel training on improving table tennis service technique skills among students in the Table Tennis Student Activity Unit (UKM). The findings indicate that both the experimental and control groups experienced improvements in service performance after the training period. However, descriptively, the experimental group demonstrated a greater increase compared to the control group, suggesting that the New Spin Wheel training provides more varied and specific practice stimuli that support motor skill development.

Despite these improvements, inferential statistical analysis revealed no significant difference between the experimental and control groups ($p > 0.05$). This result suggests that, at the 5% significance level, the effectiveness of the New Spin Wheel training method has not been statistically confirmed as superior to conventional training methods. This limitation may be influenced by factors such as the relatively small sample size, initial differences in group abilities, and limited control over external variables inherent in quasi-experimental designs.

However, from an inferential perspective, the statistical analysis showed no significant difference between the experimental and control groups ($p>0.05$). This indicates that the effectiveness of the New Spin Wheel method has not been proven strongly at the 5% significance level. This insignificance may be influenced by several methodological factors, including the relatively small sample size, differences in initial ability levels between the groups, and limited control of variables in a quasi-experimental design. Nevertheless, the results of the paired sample t-test showed a significant increase between pretest and posttest scores in the experimental group ($p< 0.05$).

Although the New Spin Wheel training method does not demonstrate statistically significant superiority over conventional methods, it shows practical relevance in improving service technique skills. Therefore, this method can be considered a complementary training approach in table tennis coaching. Future studies are recommended to involve larger samples, longer intervention durations, and more rigorous experimental designs to obtain more robust and generalizable findings

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