

THE EFFECT OF EXERCISE AND EYE-HAND COORDINATION METHOD ON FOREHEAD TOP-SPIN HIT IN TABLE TENNIS

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ABSTRACT: This study aims at finding a good method to enhance accuracy competence of forehand topspin hit in table tennis, revealing whether the coordination competence influences the improvement of accuracy result of forehand topspin hit in table tennis and finding suitability whether the method of massed practice and distributed practice are better done on the competence of high or low coordination in enhancing the accuracy result of forehead topspin hit in table tennis. In this study, Quasi Experimental Design method is employed, which is a type of experiment using all intact subjects to be given treatment. The design is quasi experimental study with the type of "Counterbalanced Design". In Counterbalanced design employs four groups which all groups are experimental group and there is no control group for in this design each group is given treatment. In this study, pre test is not used, but in this study, each group is given post test as a benchmark of exercise training. The result is as follows: With $\alpha = 0,05$ shows that the presence of groups and method being used gives significant effect difference in learning result. In definition, there is difference in the effect on groups for the achievement of learning result. Likewise, method gives different in effects on learning result. Meanwhile, learning period does not give influential difference, then learning result between groups KR2 and KR1 is not significantly different. Between KR1 and KT1 is not significantly different. Between KT1 and KT2 is not significantly different. However, between KR2 and KT1 it is seen that KT1 is better than KT2. Furthermore, between KR1 and KT2, it is seen that KT2 is better than KR1. Briefly, $KR2 < (KT1 = KR1) < KT2$.

1. Introduction

In the process of learning or exercise of modern table tennis in developed countries, many coaches use autorobot as ball thrower which can set up the speed, accuracy and direction of the ball, even various ball rotation, can be done in stable without changing the setting used. In addition to autorobot, the use of video recordings to see the game played by professional athletes or athletes having quite good skill, also see the game they play after being recorded through video to see the weakness taking place when performing a hitting movement in the table tennis game, it can be used as feedback to be able to be used as review. By the use of visual recording method as feedback of mistakes occurred can be corrected by correction and repeated in the further exercise. The video used can be the standard one provided by the company or self-made (Suherman, 2009: page. 118).

One cause of Indonesian sport lag is the lack of human resources, especially the coach as the spearhead having awareness and capability to utilize the results of study

Keyword. Method, Coordination and Topspin.

about advanced exercise methodology, the support of media which is an advanced technology product, such as the utilization of autorobot and visual recording (video), which in developed countries they have been used as one dominant support in learning or exercise and has been proved in the achievements they get. To avoid worse lag and the lag in utilizing technology will not occur, the author tries to present exercise/learning by using appropriate exercise method, the use of exercise media such as autorobot and visual recording (video) as feedback on the improvement of hitting accuracy. Based on the findings in the field, most of table tennis coaches in West Java have not understood comprehensively the concept of massed and distributed practice method. Although in practice, it has been widely applied.

Singer (1975: page 379) in Supandi (1986: page 26) suggested that massed practice method is “method of consistent and continuous practice without taking rest between the sessions. Distributed practice is a practice divided by several short sessions interspersed by taking rest.” Magill (1985:373) in Supandi (1986: page 27) defining that “Massed practice is a practice which the rest time is short or there is no rest at all in distributed practice is a practice having relatively long rest time. Distributed practice is an exercise interspersed by longer rest time compared to massed practice.” Schmidt (1991: page 384) mentioned that “Distributed practice is an exercise done interspersed by rest time, so that it gives opportunities to perform body regeneration.

Through this study, beside desiring to apply more scientific approach in the exercise, it is expected to give more contribution in the improvement of exercise quality through more comprehensive analysis about methodology in the exercise, especially about the application of massed and distributed practice method.

The utilization of an appropriate exercise method, the use of media of an advanced technology product in this case is autorobot and visual recording to obtain feedback, can make several advantages for athletes and coaches. Several advantages obtained are: (1) Process and result of learning are expected to be more qualified; (2) Coaches and athletes are not lagged in following the advancement of exercise method utilization, the use of exercise/learning media autorobot and visual recording; (3) Able to develop research by developing exercise methods, employing learning media autorobot and visual recording.

Research problem of this study is : What is the effect of method and eye-hand coordination on accuracy of forehand topspin hit in table tennis?

Based on the background stated in this study, it is revealed that the support of media with advanced technology advancement in sport, especially in table tennis sport, highly supports the improvement of learning or to improve accuracy. The problem is how to motivate the athletes to have true desire to learn and have ability to use appropriate exercise method, the ability to improve the coordination of athletes, and ability to use autorobot and visual recording as the learning or exercise media. In fact, developed countries in term of sport have coach resources with awareness and competence to utilize the results of study about the advanced model

or exercise method which is the most appropriate, effective exercise to enhance the ability to direct the balls to certain target, and to utilize modern technology media such as autorobot and video recording in the attempt to improve the achievement of athletes.

2. Research Method

In this study, Quasi Experimental Design is employed, which is a type of experiment using all intact subjects to be given treatment. The design is “Experimental Quasy Study” with the type of “Counterbalanced Design” (Ali, 2011: page 299) can be seen with the pattern as Figure 3.1. as follows.

	<i>SESSION 1</i>	<i>SESSION 2</i>	<i>SESSION 3</i>	<i>SESSION 4</i>
GROUP I	METHOD 1	METHOD 2	METHOD 3	METHOD 4
GROUP II	METHOD 2	METHOD 3	METHOD 4	METHOD 1
GROUP III	METHOD 3	METHOD 4	METHOD 1	METHOD 2
GROUP IV	METHOD 4	METHOD 1	METHOD 2	METHOD 3

Descriptions:

Method 1 : MPKT (High Coordination Massed Method)

Method 2 : MPKR (Low Coordination Massed Method)

Method 3 : MDKT (High Coordination Distributed Method)

Method 4 : MDKR (Low Coordination Distributed Method)

Group 1 : Group of High Coordination Massed Method

Group 2 : Group of Low Coordination Massed Method

Group 3 : Group of High Coordination Distributed Method

Group 4 : Group of Low Coordination Distributed Method

According to Fraenkel (1993: hlm. 253):

“Counter balanced design represent another technique for equating experimental and control groups. In this design, each group is exposed to all threathments. However many there are, but in a different or there. Any number of treatment maybe involved and example a diagram for a counterbalanced design involving three treatment is as follows.”

This *Counterbalanced design* employs four groups which all groups are experimental groups and there is no control group for in this design, treatment is given in each group. This study does not use pre test but in this design, each group is given post test as benchmark of exercise success.

Results of Study. One random choice is taken from several combination of Latin Square 4x4.

Univariate Analysis of Variance

Between-Subjects Factors			
		Value Label	N
Mhs Group	1	KT1	4
	2	KR1	4
	3	KT2	4
	4	KR2	4
Time Range of Exercise Implementation	1	pert 1-4	4
	2	pert 5-8	4
	3	pert 9-12	4
	4	pert 13-16	4
Method being implemented	1	Massed 1	4
	2	Massed 2	4
	3	Distributed 3	4
	4	Distributed 4	4

Tests of Between-Subjects Effects

Dependent Variable: Results

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.049 ^a	9	.117	6.570	.016
Intercept	121.198	1	121.198	6.833E3	.000
Group	.624	3	.208	11.724	.006
Period	.032	3	.011	.596	.640
Method	.393	3	.131	7.389	.019
Error	.106	6	.018		
Total	122.353	16			
Corrected Total	1.155	15			

^a. R Squared = .908 (Adjusted R Squared = .770)

Based on the table above, it is seen that for group, period, and method variables, it is obtained that sig = 0,006; 0,640; and 0,019.

With $\alpha = 0,05$ shows that the presence of group and method used gives significant difference in the effect on learning result. In definition, there is difference in effect on the group for the achievement of learning result. Likewise, the method gives different in effect on the learning result. Meanwhile, learning period does not give difference in the effect.

Furthermore, advanced test with Tukey-b will be performed:

Post Hoc Tests

Mhs Group

Homogeneous Subsets

Tukey B		Result		
		<i>Subset</i>		
<i>Mhs Group</i>	<i>N</i>	<i>1</i>	<i>2</i>	<i>3</i>
KR2	4	2.4850		
KR1	4	2.6425	2.6425	
KT1	4		2.9140	2.9140
KT2	4			2.9675

Means for groups in homogeneous subsets are displayed.
 Based on observed means.
 The error term is Mean Square(Error) = .018.

Based on the table above, by seeing group of students variable, then the learning result between groups KR2 and KR1 is not significantly different. Between KR1 and KT1 is not significantly different. Between KT1 and KT2 is not significantly different.

However, between KR2 and KT1, it is seen that KT1 is better than KR2. Furthermore, between KR1 and KT2, it is seen that KT2 is better than KR1.

Briefly, $KR2 < (KT1 = KR1) < KT2$

Time Range of Method Implementation

Homogeneous Subsets

Tukey B		Result
		<i>Subset</i>
<i>Time Range of Method Implementation</i>	<i>N</i>	<i>1</i>
pert 9-12	4	2.6850
pert 1-4	4	2.7415
pert 5-8	4	2.7800
pert 13-16	4	2.8025

Means for groups in homogeneous subsets are displayed.
 Based on observed means.
 The error term is Mean Square(Error) = .018.

Based on the table above, it is evident that any period shows significant difference in effect on learning result.

Method being implemented. Homogeneous Subsets

Result

Tukey B

<i>Method being implemented</i>	<i>N</i>	<i>Subset</i>	
		<i>1</i>	<i>2</i>
Massed 2	4	2.5575	
Massed 1	4	2.6765	2.6765
Distributed 3	4	2.7925	2.7925
Distributed 4	4		2.9825

Means for groups in homogeneous subsets are displayed.
 Based on observed means.
 The error term is Mean Square(Error) = .018.

Based on the table, between the methods of Massed 2, Massed 1 and Distributed 3 the effect is not different.

Furthermore, between the methods of Massed 1, Distributed 3 and Distributed 4 the effect is also not different.

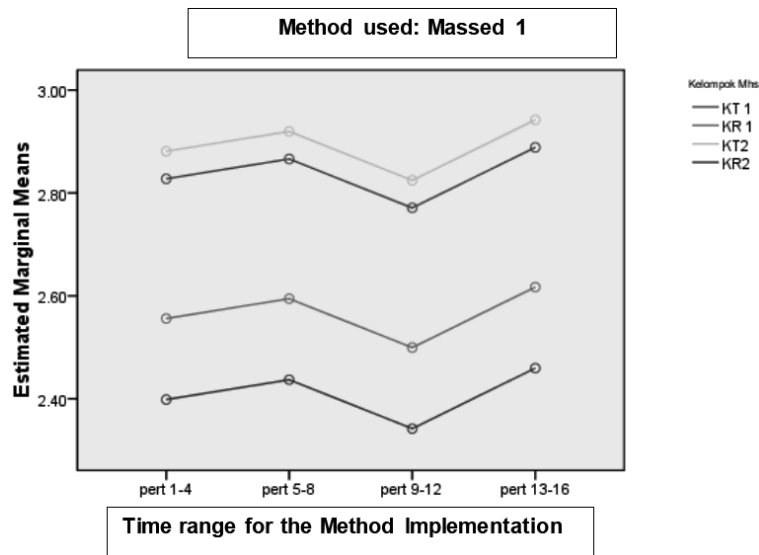
The most prominent one is a convincing difference between methods of Massed 2 and Distributed 3, which method of Distributed 3 is better than Massed 2.

However, mathematically, the difference of all methods exists, although it is small, which $Massed\ 2 < Massed\ 1 < Distributed\ 3 < Distributed\ 4$.

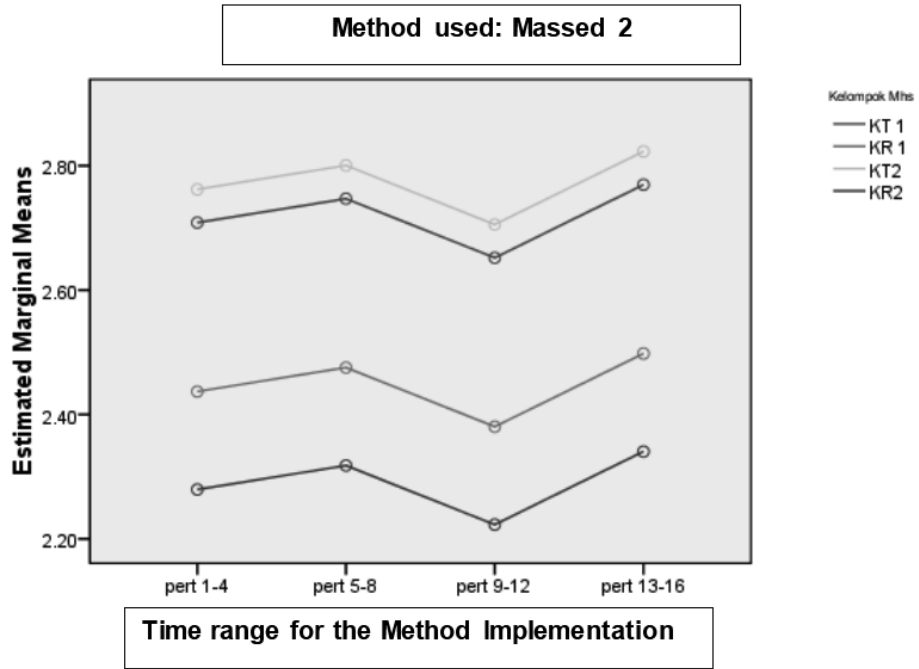
3. Profile Plots

Time Range of Method Implementation* Mhs Group * Method being Implemented

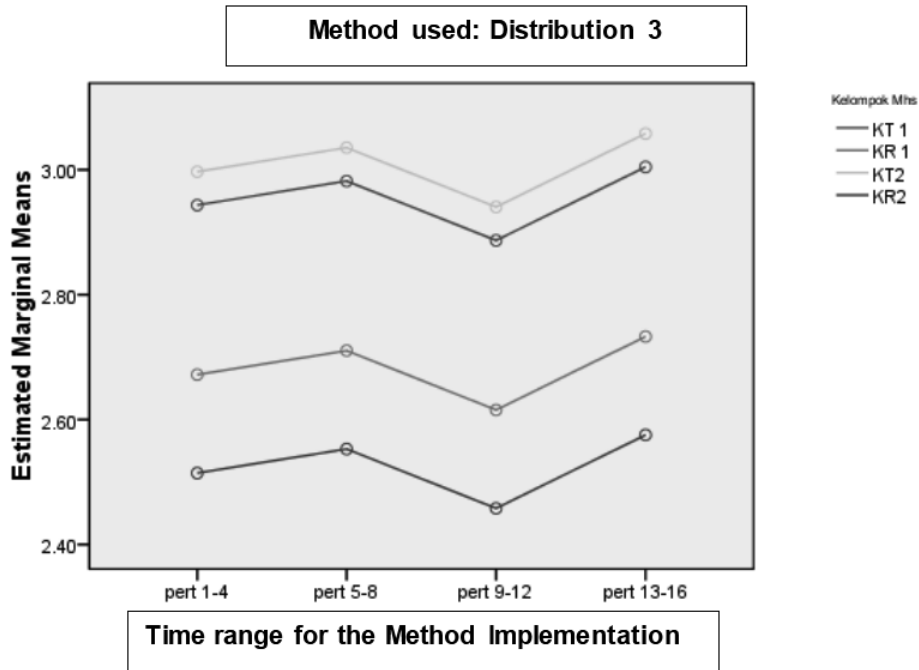
Estimated Marginal Means of the Result



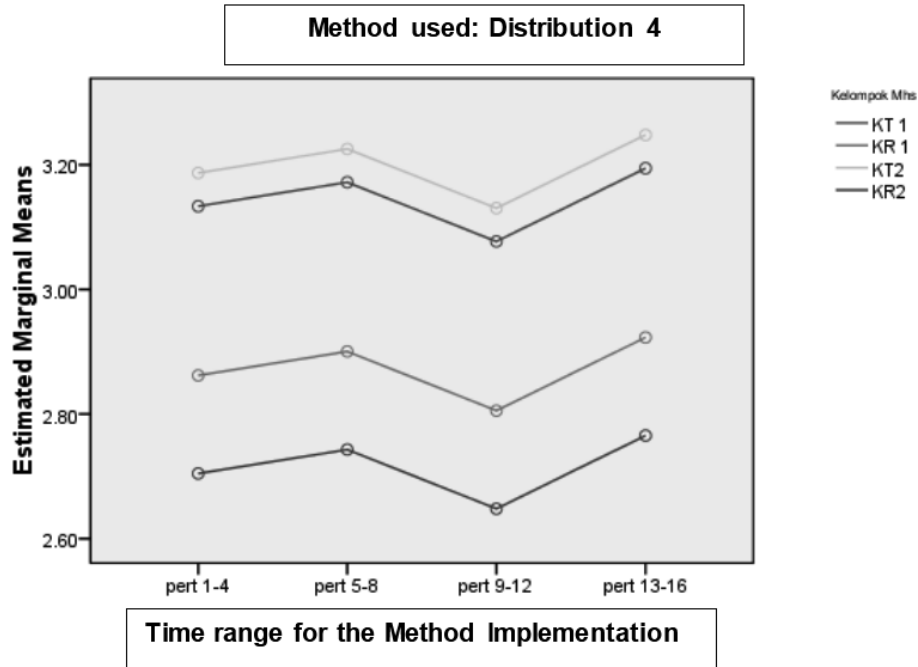
Estimated Marginal Means of the Result



Estimated Marginal Means of the Result



Estimated Marginal Means of the Result



4. Conclusions

1. There is a significant difference between students doing exercise by using massed practice method and distributed practice method.
2. There is a significant difference in the effect between students or athletes having high and low eye-hand coordination on accuracy competence of forehand topspin hit in table tennis.
3. There is a significant combined effect on accuracy competence of forehand topspin hit between those who follow massed practice and distributed practice exercises are also significantly different on the accuracy competence of forehead topspin hit with eye-hand coordination between high coordination and low coordination.

Recommendations.

1. For further studies, based on limitation of study which is limited samples of study, limited scope of hitting techniques in table tennis, limited review of tactics and strategies in table tennis game, it is recommended that a review about this learning is performed (a) not only forehand topspin hit in table tennis, but also can be performed in other hitting techniques such as *push, drive, block, chop, service, topspin, smash, balloon (lob) defence, flick, dropshot, flat, loop*, or from the aspect of *forehand* and *backhand*; (b) From the aspect of sample area, not only the members of PTM Bumi Siliwangi, (c) but can be performed to PTM, students from other schools or can be

extended until broader level such as regional, national and international athletes, so that other factors which are assumed to influence learning result such as game type, interest or motivation, ethnic group, geographical condition can be assessed; (d) more comprehensive study from each hitting technique specifically, such as levels of ball rotation, levels of ball speed, or levels of hitting target.

2. For the teachers, coaches of table tennis to find method to perform multimedia comparative study. Learning by using massed practice method and distributed practice method is recommended to be used more frequently, for it has been proved to be able to give better result than only use conventional learning.
3. For PTM administrators, principle, educational institution administrators, or sport organization administrators should be more open to prepare or organize advanced equipment which can be used to develop learning methods and media or sport exercise, particularly table tennis.

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