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ORIGINAL RESEARCH

The influence of exercise and coordination methods hand eye coordination on the accuracy of badminton service

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Abstract

Service in the game of badminton is an important component of determining the victory in the match. The purpose of this study was to determine whether the coded hands and training methods can influence the success of service in badminton games. The research method used was an experiment using a 2x2 factorial design; the study was conducted by comparing the acquisition of pre-test and post-test results. The subjects of this study were 20 people. According to the analyses of normality and homogeneity, a two-way ANOVA was used to compare variables. The results revealed that there were a significant influence between hand-eye coordination and training methods on service in playing badminton p of 0.000 <0.05. This gives a clue that in the long service accuracy exercise, the application of the target practice method changes more precisely in improving the accuracy of the long service. The changed target training method is proven to be able to have a significant effect in increasing the accuracy of badminton length service.

Keywords: Badminton, hand-eye coordination, training methods, service.

Introduction

Badminton game is one of the popular sports games and sports that are popular and are in demand by Indonesian people of all ages. In line with this statement, several research findings reveal the same thing that badminton is a sport that interests various age groups, different levels of skill, and men and women play this badminton sport. Badminton can be played indoors or outdoors for recreation or as a venue competition (Pratomo et al., 2013). Badminton itself is one sport that is also included in the material and extracurricular activities that are taught in physical education in recreational health in Indonesia (Yane, 2016). Katili, Abduh, & Tadulako, (2018) also revealed that badminton is one of the most popular and popular sports in the country of Indonesia, badminton is also applied in the learning of health care in schools.

Talking about badminton itself has a meaning that is, badminton is characterized by various actions with short duration and high intensity coupled with short rest periods (Seth, 2016). Badminton is a technique-oriented sport and requires a racket when playing it in a badminton game when carrying out a ball attack with subtle strength and technique besides the need for coordination of all parts of the body in this game Huang et al. (2015). In the game of badminton, several techniques that need to be considered one of the techniques that determine the success of the match is service. In line with this statement, states that the service stroke is the first blow that starts a badminton game. Service is the most important technique part in the game of badminton, because service is the first form of blow that is used as the first weapon in the attack pattern (Wijaya, 2017).

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To get a good long service accuracy, there are many factors that influence, two factors that are considered important and must be highly considered are the players must have a good training method and the existence of eye-hand coordination these two factors are needed for mastering the basic service accuracy. (Furqon, 2011) the training method is the procedure and method of choosing the type of exercise and its arrangement according to the difficulty level of complexity and weight. There are several methods of target play practice namely a game where the player will get a score if a ball or other similar projectile is thrown or hit with a directional on a predetermined target and the fewer blows to the target the better (Fathan Nurcahyo, 2013).

Meanwhile, the eye-hand coordination is a combination of eyes and hands to interact with each other in response to movements that will be carried out and direct in the right direction to cross the ball to the area of the opponent's game, harmonious, and stimulant, so that it appears flexible and easy (Sukardiyanto, 2015). Hand-eye coordination is a skill in fixing a hit on a target that can be used by players in performing long service (Gilang, 2011). Eye-hand coordination is very important, namely when we see the ball soar, the hands start to square off hitting the shuttlecock quickly and sharply toward the target on the field and this is also the need for a reaction from each player (Yusuf, 2015).

Although these two factors are very important components, the fact is based on information from the trainer and direct observation several times at SMA Negeri 2 Lubuk Linggau City, South Sumatra Province and State Vocational High School 2 Tugumulyo Musi Rawas Regency, South Sumatra Province on July 26, 2018, that the game was performed by players, especially long service is not perfect, making the results obtained are less than optimal. This problem is also supported by the results of observations of researchers in inter-school tournaments and the 2017 Victor Wako Cup badminton championship in the city of Lubuk Linggau, South Sumatra Province, showing an average percentage of 27.38% long service success in each match. Starting from a long service, shot drop, short balls , and smashes should be used to get points. From this, of course, there will be a gap between the instructor's instruction on the target and the athlete's execution results on the field. The gap in the implementation of long service techniques especially in the low level of accuracy needs to be addressed in the training session.

Based on the existing problems, the researcher will conduct experimental research on the practice method and hand-eye coordination on student service punches, the researcher also observes the lack of research results regarding these two variables in the badminton game at Lubuk Linggau State High School 2 and State Vocational High School 2 Tugumulyo, so that interesting to study. The results of this study are expected to be able to become a reference in fixing student service punches, then it is expected that the results of this study can be a reference for other research with different and broader subjects and places.

Methods

The design used in this study was an experimental method using a 2x2 factorial design. This method tests (validation) that is testing the effect of one or more variables on other variables. This study uses population research because the total population is a research sample of 40.

This research instrument for hand-eye coordination uses a tennis ball throwing test with a wall as the target adopted from (Ismaryati, 2011), and the training method using long service accuracy was adopted from (Nurhasan, 2011). The procedure of eye-hand coordination research is With one hand and captured with the other hand, before conducting the test, the test may try first until you feel used to it. Whereas the training method is: Players stand in an area that is cornered with the target part of the field. The player tries to serve, is directed to the target area and he tries to pass the shuttlecock on the rope with a valid service technique. Each test is allowed to serve 20 times.

Data analysis was performed with SPSS 22. Statistical significance level was accepted as 0.05. The analyses of the normality test and the homogeneity were performed before the comparing the data. A two-way ANOVA was used to compare the groups and Tukey test was performed to determine the paired groups. To compare the average pair of treatments the Tukey test was used, before the two-way ANOVA test was performed first, the prerequisite test analysis was the normality test and the homogeneity test.

Results

Based on the results of the research that has been carried out then it is concluded that there is an influence produced between the training method and the coordination of the hand too long service in the game of badminton, the results of the study explain that the two things have a very significant effect on the results of the service.

Table 1 above shows the difference between the training method and the coordination calculated through ANOVA with scores value is 0.000<0.05. Based on this, it means the hypothesis which states that there is a significant interaction between target play training (fixed target and target change) and hand-eye coordination (high and low) to the accuracy of badminton service length in Extracurricular participants in SMA Negeri 2 Lubuk Linggau and SMKP Negeri 2 Tugumulyo has proven. The results of this study also presented a diagram of the results of the interaction between the training methods (fixed targets and target changes) and eye and hand coordination (high and low) to the accuracy of the length of badminton service in Extracurricular participants in SMA Negeri 2 Lubuk Linggau and SMKP Negeri 2 Tugumulyo. seen in figure 15 as follows. The diagram of the research results can be seen in Figure 1.

After testing the interaction between the training methods (fixed target and target change) towards the accuracy of badminton service length in Extracurricular participants in Lubuk Linggau High School 2 and Tugumulyo State Vocational High School 2, it is necessary to conduct further tests using the Turkey test. The results of further tests can be seen in Table 2.

Based on Table 2, the calculation of the Turkey test shows that pairs that have significantly different interactions or partners are: (1) A1B1-A2B1, (2) A2B1-A1B1, (3) A2B1-A1B2, (4)) A2B1-A2B2, (5) A1B2-A2B1, (6) A2B2-A2B1, so it can be concluded that:

The group of extracurricular participants who are trained using fixed target exercises with eye and foot height coordination is paired with a group of students who are trained using target practice changes with eye and hand coordination there is a significant difference in influence. The group of students who were trained using target practice changed with high eye and hand coordination, with a significance value of 0.001 <0.05.

Table 1

Interaction analysis of training methods (fixed target targets and changed target targets) with coordination (high and low).

Source	Type III Sum of Squares	df	Mean Square	F	p
Exercise Method X Coordination	23322.000	1	23322.00	25.290	0.000*

** p<0.05*

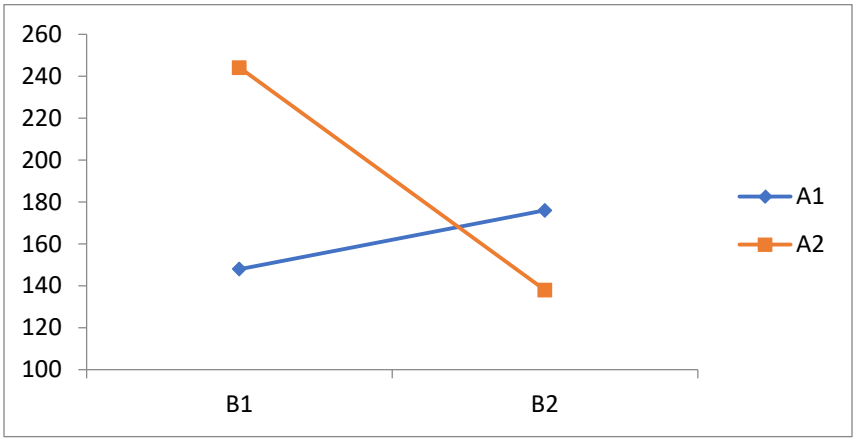

Figure 1. Interaction results between the training method (fixed target and target changed) with coordination (high and low).

Table 2
Summary of post hoc test results.

Groups	Interaction	Mean Difference	Std. Error	*p*
A1B1	A2B1	-96.00*	18.84	0.01
	A1B2	-28.00	18.84	.468
	A2B2	10.00	18.84	.950
A2B1	A1B1	96.00*	18.84	.001
	A1B2	68.00*	18.84	.011
	A2B2	106.00*	18.84	.000
A1B2	A1B1	28.00	18.84	.468
	A2B1	-68.00*	18.84	.011
	A2B2	38.00	18.84	.223
A2B2	A1B1	-10.00	18.84	.950
	A2B1	-106.00	18.84	.000
	A1B2	-38.00	18.84	.223

** p<0.05*

The group of extracurricular participants trained using target practice changes with high eye and hand coordination paired with a group of students trained using fixed target exercises with high eye and hand coordination there is a significant difference in influence. The group of extracurricular participants who were trained using target practice changed with a better eye and foot coordination than the group of students who were trained using fixed target exercises with eye and hand coordination, with a significance value of 0.001 <0.05.

The group of extracurricular participants trained using target practice changes target with high eye and hand coordination paired with the group of extracurricular participants trained using fixed target exercises with low eye and hand coordination there is a significant difference in influence. The group of students who were trained using target practice changed with high eye and hand coordination better than the group of extracurricular participants who were achieved using fixed target exercises with low eye and hand coordination, with a significance value of 0.011 <0.05.

The group of extracurricular participants who were trained using the target exercises changed with high eye and hand coordination paired with the group of extracurricular participants who were trained using the target exercises changed with low eye and hand coordination there was a significant difference in influence. The group of extracurricular participants who were trained using target exercises changed with high eye and hand coordination better than the group of students who were trained using target targets changed with low eye and hand coordination, with a significance value of 0.000 <0.05.

The group of extracurricular participants who were trained using fixed target exercises with low eye and hand coordination, paired with the group of extracurricular participants who were trained using target exercises changed with high eye and hand coordination there was a significant difference in influence. The group of extracurricular participants who were trained using target exercises changed with high eye and foot coordination better than the group of extracurricular participants who were trained using fixed target exercises with low eye and hand coordination, with a significance value of 0.011 <0.05.

The group of extracurricular participants who are trained to use target practice changes with low eye and hand coordination paired with an extracurricular group of participants who are trained to use target exercises to change with high eye and hand coordination there is a significant difference in influence. The group of extracurricular participants who were trained using the target exercises changed with high eye and hand coordination better than the group of extracurricular participants who were trained using target exercises with

low eye and hand coordination, with a significance value of 0.000 <0.05.

Whereas the other pairs stated do not have differences in influence are (1) A1B1-A1B2, (2) A1B1-A2B2, (3) A1B2-A1B1, (4) A1B2-A2B2, (5) A2B2-A1B1, and (6)) A2B2-A1B2. Thus it can be concluded that: The group of extracurricular participants who were trained using fixed target exercises with high eye and hand coordination was paired with the group of extracurricular participants who were trained using fixed target exercises with low eye and hand coordination there was no significant difference, with a significance value of 0.468 <0.05.

The group of extracurricular participants who were trained using fixed target exercises with high eye and hand coordination was paired with the group of extracurricular participants who were trained using target exercises that changed with low eye and hand coordination there was no significant difference in influence, with a significance value of 0.950 <0.05.

The group of extracurricular participants who were trained using fixed target exercises with low eye and hand coordination was paired with an extracurricular group of participants who were trained using fixed target exercises with high eye and hand coordination there was no significant difference in influence, with a significance value of 0.468 <0.05.

The group of extracurricular participants who were trained using fixed target exercises with low eye and hand coordination was paired with the extracurricular group of participants who were trained using target training changes with low eye and hand coordination there was no significant effect, with a significance value of 0.223 <0.05.

The group of extracurricular participants who were trained using target exercises changed target with low eye and hand coordination paired with the group of extracurricular participants who were trained using fixed target exercises with high eye and hand coordination there was no significant difference in influence, with a significance value of 0.950 <0.05 .

The group of extracurricular participants who were trained to use target practice changed with low eye and hand coordination paired with the extracurricular group that used fixed target exercises with low eye and hand coordination there was no significant difference in influence, with a significance value of 0.223 <0.05.

The results of the paired variable analysis with Turkey's further tests showed that there were 6 significantly different pairs, namely: (1) A1B1-A2B1, (2) A2B1-A1B1, (3) A2B1-A1B2, (4) A2B1-A2B2, (5) A1B2-A2B1, (6) A2B2-A2B1, while the other pairs are declared no difference, namely: pairs: (1) A1B1-A1B2, (2) A1B1-A2B2, (3) A1B2-A1B1, (4) A1B2- A2B2, (5) A2B2-A1B1, and (6) A2B2-A1B2.

Discussion

The method or method of practicing the correct length of badminton service by using the same targets continuously and not changing the goals of a set can be completed determined by the trainer. Meanwhile, the target changing method is a method or way to practice the accuracy of badminton long service by using the changing target in each set according to the player's wishes (Nafi, 2015) Motion that occurs in sports activities, is a result of the stimulus that is processed in the brain and then responded through muscle contraction, after receiving orders from the nervous system command, namely the brain. Therefore motion skills are always related to the internal motor system of the human body, the results of which can be observed as changes in the position of a part of the body or limbs (Li, 2014). This is based on the law of exercise learning theory proposed by Thondrike (Rahyubi, 2012) which states that "the principle of training law shows that the main principle in learning is repetition, the more often the subject matter is repeated the more mastered it will be.

This is in line with the results of research conducted by Singh et al., (2016), which is based on the research findings revealed that in the pre-test and post-test stages there were significant differences in results during the study conducted six weeks. Significant improvements in short and high service may be due to the effects of specific training schedules for players. Yusuf (2015) explained that arm muscle strength and hand-eye coordination are important factors and components that must be trained properly to become good badminton players. This is because in the game badminton is the main weapon in the game. The success of badminton athletes in the future can also be seen from the ability of these two components by the coach. Handayani (2018) explained that there was a very significant relationship between eye-hand coordination and arm muscle strength to the efficacy and service provision in badminton games. From the results of data analysis using the multiple correlation formula, the correlation coefficient value is 0.89 and the result of

the significant test turns out that F count is greater than F table.

Herman (2019) explained that hand- eye coordination and training methods on the wrist contribute simultaneously to the success and accuracy of service in badminton games. The results revealed that both of them are factors that must be considered more to be able to increase the success of athletes in the match because service is the beginning of the game so that it determines the overall success of the game. its purpose (Suharno, 2011) Coordination is needed to bring together several elements so that they can make the same goal. Here the author requires two elements, namely eye-hand coordination in performing service movements. In addition to the role of coordination, arm muscle power is also a supporting element in supporting the success of long service. Power or explosive power is the ability of a muscle or a group of muscles to overcome load resistance with strength and high speed in one complete movement (Suharno, 2011). In badminton players, the ability between eye-hand coordination and athlete training methods can be used as a reference coach to be able to distinguish talented athletes and not, because these two components can distinguish the ability of outstanding athletes, athletes who do not excel and individuals who are not from athletes (Jaworski et al., 2020).

This is also supported by the results of research that has been done by (Yadav & Murtaza, 2018) where the results of the study stated that the results of the study explained that there are differences between tennis and badminton athletes in agility training, further explained that badminton athletes have more agility. good compared to tennis athletes and then physical exercise badminton players better than tennis players. Likewise with the results of research conducted by (Mishra et al., 2017) which concluded that there were significant differences felt by badminton players on circuit training conducted in 6 weeks, the difference that was felt to be the most striking was heart rate rhythm which is more advanced than before the existence of this circuit training, further explained in the implementation of badminton games, especially long service demands the accuracy of sight and accuracy of punches and the ability of athletes to handle the tension associated with heart rate or rhythm. In this case, hand-eye coordination is very important to support the success of a good and right hit. Judging from the long service movements in the game of badminton consists of several elements of movement namely, anticipating the ball, hitting the ball properly and a good final attitude, in addition to that, every shot made must be directed to the desired target. Combining long service movements in badminton and placing the ball on the desired target requires good eye-hand coordination.

This is following the statement Mulyono (2011) namely, "Force to see the point where the hand meets the ball. Make a decision where the ball will be hit before the ball arrives so that the ball can be seen consciously until the ball leaves the hand". This opinion shows that every lob in a badminton game always requires good hand-eye coordination. Every ball coming must be able to observe it properly and position itself properly and make a long service stroke in the badminton game correctly. Besides punches must be directed at difficult areas or weak points of the opponent with good hand-eye coordination, so long service stroke movements in badminton can be done effectively and can place the ball exactly on the desired target.

Hand-eye coordination is an important component that must be possessed by badminton athletes to support athlete success, then, in addition, it requires fictional training and training methods that are appropriate for athletes to develop and support the success of Kumar (2018) and Wong et al., (2019) revealed that the performance of amateur badminton players is influenced by several factors, one of the most important focus to be developed is the coordination between the eyes of the hand, this is because the hand is a member of the body used in badminton games

Conclusion

The results showed that the application of the fixed target training method and the changed target training method had a significant difference in effect on the accuracy of badminton length service in extracurricular participants at SMA Negeri 2 Lubuk Linggau and SMK 2 Negeri Tugumulyo. This gives a clue that in the long service accuracy exercise, the application of the target practice method changes more precisely in improving the accuracy of the long service. The changed target training method is proven to be able to have a significant effect in increasing the accuracy of badminton length service for extracurricular participants at SMA Negeri 2 Lubuk Linggau and SMKP Negeri 2 Tugumulyo. The results of the research can be practically used as an ingredient for trainers, as well as coaches of badminton in making

appropriate training programs to improve the accuracy of long service. Thus the exercise will be effective and will get results by i what is expected by researchers.

Authors' Contribution

Study Design: YT, SS, MIR; Data Collection: YT, SS; Statistical Analysis: YT, MIR; Manuscript Preparation: YT, SS, MIR; Funds Collection: YT, SS.

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Conflict of Interest

The authors hereby declare that there was no conflict of interest in conducting this research.

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