

The Influence of Learning Methods and Physical Skills (the Power of Leg Muscle) on the Learning Outcomes of Kick volleyball Sports

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The process of providing learning methods improves the learning outcomes of kick volleyball sports. Physical skill is the determinant of the quality and quantity of the learning outcomes. The purpose of the study was to determine the effect of mind mapping and discovery learning methods by involving physical skills (leg power exploitation), to improve the learning outcomes of kick volleyball sports. The study uses an experimental method, with a 2x2 level design with a post-test, a treatment control, and a pre-test, with a sample of 60 students using physical skills test instruments (exploitative power of leg muscles, Vertical Jump). The research results obtained by an ANOVA test show the differences in the learning outcomes taught by two different learning methods, through physical conditions (exploitative power of leg muscles). The test shows $F_0(A) = 14.251$ with $p\text{-value} = 0.000 < 0.05$, or H_0 rejected. There are differences in the average learning outcomes between students, who are taught with the two different learning methods, with $F_0(B) = 21,167$ with $p\text{-value} = 0.000 < 0.05$ or H_0 rejected. Also, there are differences in the average sports learning outcomes of the students who have high and low physical skills (limb

muscle power). Furthermore, $F_0(AB) = 18.143$ with $p\text{-value} = 0.000 < 0.05$ or H_0 rejected. The result shows that there is a significant interaction effect between factor A (learning methods) and factor B (physical skills such as the exploitative power of leg muscles) on the learning outcomes. Thus, there is no average difference between the main mapping learning method and the discovery learning method in students who have low physical exploitation power of the leg muscles. The conclusion is that the mind mapping learning method is more effective to use for teaching kick volleyball sports than discovery learning methods for students who have high physical skills. For students with low physical skills, mind mapping learning methods and discovery learning methods do not have different effects on the learning outcomes of kick volleyball sports.

Key words: *Learning Outcomes of kick volleyball sports, Learning Methods, and Physical Skills.*

Introduction

In the learning process, lecturers/teachers and students are the two components that must be intertwined to support each other in achieving the optimal learning outcomes (Rustaman 2001). Both factors are determinants in the success of learning kick volleyball. In the process, a teacher must play an active role in using any learning approach and behave as an activator beyond the facilitator or guide (Hattie 2012), to maximise the role of physical education teachers in managing the learning material for students, which is known as the Mosston and Asword learning method. The Mosston learning method is a reference in physical education programs that are widely applied by physical education teachers throughout the world (Jaakkola and Anthony 2011; Cothran et al. 2005; Tones, Jones, and Keskitalo 2011). In Indonesia, physical education teachers have not fully implemented the learning method based on the concept of Mosston (Setiawan and Nopembri 2013), and they do not yet know the appropriate learning method (Prasetyo 2013).

According to Ina (2017), there are 20 learning methods, including mind mapping and discovery methods. The findings will be valuable information for physical education teachers that can be used as a choice and reference in deciding which learning methods are suitable for the learning materials and characteristics of students (Byra and Jenkins 2000). Therefore, the research on the use of learning methods in physical education has always been an exciting and useful thing to do (Byra and McCullick 2002).

According to Ina (2017), mind mapping is a method of learning by applying the way of thinking over time to a problem, from the start to the end solution. Teaching through mind mapping is presented in the form of schemes that have a causal relationship that influences

each other. The mind mapping method improves students' analysis and critical thinking to understand something as a whole from beginning to end.

a. The Strengths of Mind Mapping include:

- 1) The method is more effective and efficient.
- 2) New ideas and creativity.
- 3) It can be a practical and useful way of thinking about other things.

b. The Weaknesses of the Mind Mapping Model are:

- 1) Only active students can get involved.
- 2) It requires a base with a lot of reading before making a mapping.

The discovery method is a modern teaching method that is done by developing student learning methods to become more active, independent, and have a better understanding. Students look for answers to their questions so that they can be remembered better. The strategy calls for the discovery strategy. Students become more active in searching for, understanding, and finding answers or related material. Students are also able to analyse the knowledge they get and then transfer it to the community.

a. The Strengths of the Discovery Method include:

- 1) Develop the student's cognition, and increase the mastery of skills.
- 2) Knowledge is obtained in its way so that it becomes more independent and thinks more broadly.
- 3) It can adjust the ability of students themselves.

b. The Weaknesses of the Discovery Methods include:

- 1) Mental preparation is needed in the learning process.
- 2) The technique is suitable for small classes.

The right learning methods are needed to improve the learning outcomes of kick volleyball sports. Students can have excellent skills by learning the right way. So what is meant by kick volleyball?

Kick volleyball is a modern traditional sport that has been modified and recognised throughout the world (Kosni et al. 2017). The first kick volleyball was introduced in the 10th Asian Games in Beijing in 1990 and began to develop in more than 20 countries (Jawis et al. 2005). Kick volleyball is now a recreational and competitive sport that is played throughout the world and is being promoted to be a team event at the Olympic Games (Sujae and Koh 2008). (Chatoupis, 2005) Kick volleyball is played in a team of three, which consists of

tekong, feeders, and spikers. A tekong is responsible for taken services; a feeder feeds the ball to a tekong while the spiker is in charge of spiking the ball (Kosni et al. 2018).

In Indonesia (Astra, Ketut and Artanayasa, 2017), China (Chen et al. 2018), the Philippines (Chen and Xiao 2017), Malaysia (Ham rid et al. 2015) and other countries, kick volleyball is part of the curriculum of learning in tertiary institutions. Kick volleyball is well suited to physical education goals that make the players have good manipulative movement skills, excellent physical condition, speed in making decisions in moving, and emotional stability (Yusup 2001). As for the basic techniques, it includes kicking, heading, understanding, shoulder to shoulder, soccer, accepting the first ball, smash, block and bait (Hakim, Sudarsono, and Bulqini 2007). To play kick volleyball, you must first master the sport of kick volleyball, because mastering necessary skills before learning more complex skills is very important (oh, Golubović, and Bratić 2004).

Researchers learn the basic techniques of kick volleyball are done using the game approach (Yulianti 2014; Sigit 2014; Arman, Sulaiman, and Rustiadi 2013; Widodo and Sudarso 2018) with a modified volleyball ball (Saputra, Yarmani, and Sugihartono 2017 approach; Nizam, Hidasari, and Triansyah 2017; Sunarto, Triansyah, and Yunitaningrum 2016). The findings of the studies suggest that each can improve the learning outcomes of basic techniques. But the results were not made for the whole kick volleyball sport, only for one basic method, and the sample was elementary school students and junior high school students. They certainly can only be applied at the same sample level and in specific kick volleyball techniques.

A continuous training process can produce a person's excellent motor skills. Without a well-programmed exercise, motor skills cannot be achieved as desired, including physical skills in kick volleyball. Richard A. Magill (2011) explains that what is meant by skills is the act or implementation of a task that consists of several motor responses and perceptions obtained through learning.

Bompa (2009) states that the learning of a new skill set is a part of the process, which may not always be broken into discrete pieces, as the steps are often blended. During the first part of learning a new skill, the athlete should receive a detailed explanation of the skill and observe the skill being performed. The point is that in essence, the learning of one's skills can be mastered well if a structured and programmed process is carried out over a sufficiently long period so that one's skills will peak.

Meanwhile, according to Edwards (2011), motor skills are not only influenced by the physical component but also are affected by several domains, namely: the motor domain, cognitive domain, and perceptual domain. William compares it with when someone drives a car. William asks how should driving a car be classified, for example? There are important

cognitive demands when driving. A driver must know the rules of the road and understand procedures, such as shifting gears and steering in operating corners. The perception is also crucial for driving. It detects changes in road conditions, other traffic, and the car's speed and direction that requires constant monitoring, which changes from sensory information. Finally, the driver must coordinate well on driving knowledge and the perceptions of the driving environment. The correct motor responses needed in steering, accelerating, braking, and shifting gears to achieve driving expertise efficiently and safely, given the vital contribution of each domain of knowledge when someone drives a car.

In the kick volleyball game, an athlete must also have excellent movement skills, cognitive skills, and perception skills. Especially in making smash movements, an athlete must have broad body movements, intelligence in smashing, and the right perception so that the opponent will have difficulty blocking the smash.

The students in the process of learning basic techniques require functional physical readiness. Harsono (2015) states that inadequate physical availability will slow down or limit progress in the learning techniques. Physical preparation focuses on the physical skills (exploitative power of leg muscles) of students. Physical skills (exploited leg muscle power) are supporting factors in the performance of motor skills (Fleishman 1964; Battineli 2007; Edwards 2010; Magil 2007). The components in physical skills (exploitative leg muscle strength) are muscle strength, muscle endurance, muscle strength, speed, cardiovascular endurance, flexibility, agility, and coordination (Battineli 2007).

Why are physical skills an important factor in the process of learning motion? Physical skills are part of individual traits that affect their ability to be skilled when learning new movement tasks (Fleishman 1964). One of the reasons for making mistakes in learning movement skills is due to the lack of motor skills (Čoh, Golubović, and Bratić 2004). Research findings from Cigrovski, Božić, and Prlenda (2012), Kalač and Gontarev (2014), Blazević, Katić, and Popović (2006), Iqbal, Mansur, and Nusufi (2015) find that physical skills (exploitative power of leg muscles) have a significant effect on learning sports skills.

An important component that can be improved to reach the ultimate achievement for a kick volleyball player is the physical component related to skills. An athlete will have difficulty in the process of achieving peak achievement if he is not supported by physical fitness. Sofyan Hanif. Ahmad (2015) states that it is required by kick volleyball players to have basic components for the development of the skills that are in accordance with the characteristics of kick volleyball players, which include coordination, balance, speed, reaction speed, agility, accuracy, and explosive power.

Among the above physical components, the most dominant is the exploitation of leg muscle power. The explosive power of leg muscles is the result of a combination of the motion of work power and speed. James Tangkudung (2012) says that the power is also called the elastic strength, which is a type of strength that is needed where the muscles can move quickly to a prisoner, and a combination of contraction speed and speed of motion is called power. The statement is supported by the opinion of Nicholas Ratamess (2012) who says that the explosive energy is "assessed by the time needed to reach a threshold level of force or the amount of force produced per second." It can be interpreted that the time needed to reach the threshold level of strength or the maximum amount of power produced as quickly as possible (per second). Thus, it can be concluded that the explosive power is the speed of muscle contraction when handling loads explosively with the shortest possible time (Pitsi et al, 2015).

Based on the above expert opinions and theories, and supported by relevant research, the purpose of the study is to determine the effect of mind mapping learning methods and discovery learning methods by involving Physical Skills (leg muscle power expansion) to improve the learning outcomes of kick volleyball sports.

Research Methodology

The study used an experimental method with a 2x2 level design. The population was physical and leisure physical education students in the kick volleyball skills classed at the state university of Jakarta, Indonesia. The entire population was tested using the Physical Skills test (the exploitative power of leg muscles) with instruments (vertical jump), and refers to the formula Verducci (1989) to determine the sample in this study. The result of the test was a sample of 60 people who were divided into 30 people who have high physical skills, and 30 people who have low skills. Furthermore, the grouping is divided into two groups with simple random into each group, which is mind mapping learning method (A1) with high physical skills A1B1 (15 people), low physical skills A1B2 (15 people), and discovery learning method groups (A2) with physical skills A2B1 (15 people), with low physical skills A2B1 (15 people) (Zeng et al., 2009).

The researcher gave 16 treatments of 2x50 minutes each. Before teaching the group kick volleyball learning material, such as soccer, headings, service, and smash, by following the concept of the mind mapping and discovery learning method, the researchers gave a pre-test. After that, a post-test was given to see the results of the different learning methods and physical skills (exploitative power of leg muscles) taught.

Results

Descriptive statistics are calculated for the average scores and standard deviation of the two treatment groups: 2 (physical skills as the exploitative power of leg muscles) x 2 (learning method) independent group analysis (ANOVA) is used to check whether there are significant differences between learning methods and physical skills (exploited leg muscle power).

Table 1: Average scores and standard deviations of kick volleyball learning outcomes for high physical skills and low physical skills in the two groups of learning methods (N = 60)

Groups	N	M	SD
Mind mapping/ Physical skill (exploitative power of leg muscles) High (A ₁ B ₁)	15	78,13	5,16
Discovery/ Physical skill (exploitative power of leg muscles) High (A ₂ B ₁)	15	67,28	4,12
Mind mapping/Physical skill (exploitative power of leg muscles) Low (A ₁ B ₂)	15	54,61	4,33
Discovery/ Physical skill (exploitative power of leg muscles) Rendah (A ₂ B ₁)	15	59,78	4,66

Note: M = mean, SD = Standard Deviation

Table 2: ANOVA independent group to determine differences in learning outcomes of kick volleyball sports taught by two different learning methods (N = 60)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	913.823 ^a	4	275.314	19.303	.000
Intercept	227602.024	1	116802.023	8189.449	.000
A	235.157	1	112.256	14.251	.000
B	486.044	1	597.044	21.167	.000
A * B	215.643	1	116.643	18.143	.000
Error	460.310	56	14.263		
Total	228999.178	59			
Corrected Total	2285.343	60			

a. R Squared = .591 (Adjusted R Squared = .561)

The results show $F_0(A) = 14.251$ with a p-value = 0.000 < 0.05 or H_0 rejected. It means that there are differences in the average learning outcomes of kick volleyball between students taught by the mind mapping and discovery learning methods. Meanwhile, $F_0(B) = 21.167$

with $p\text{-value} = 0.000 < 0.05$, or H_0 is rejected. It means that there are differences in the average learning outcomes of kick volleyball sports for students who have high physical muscle strength and students who have low physical ability. Furthermore, $F_0(AB) = 18.143$ with $p\text{-value} = 0.000 < 0.05$ or H_0 rejected. It means that there is a significant interaction effect between factor A (learning methods) and factor B (physical skills as the exploitative power of leg muscles) on the learning outcomes of kick volleyball.

Table 3: Results of further tests with a t-test to determine differences in the effect of learning methods and physical skills on the learning outcomes of kick volleyball

No	Contrast scores	(Se)	t_0	$t\text{-table}$	Information
1	$\bar{Y}_{A1B1} - \bar{Y}_{A2B1} (61,12 - 52,99) = 8,13$	2,15	8,13	2,07	Significant
2	$\bar{Y}_{A1B2} - \bar{Y}_{A2B2} (46,72 - 46,65) = 0,07$	2,15	0,07	2,07	Not Significant

The results are (1) $\bar{Y}_{A1B1} - \bar{Y}_{A2B1}$ with $t_0 = 8.13 > t\text{-table } 2.07$, then H_0 is rejected. It means that the students who have high physical skills in the method of mind mapping learning is higher than discovery learning methods. (2) $\bar{Y}_{A1B2} - \bar{Y}_{A2B2}$ with $t_0 = 0.07 < t\text{-table } 2.07$, H_0 is accepted. It means that there is no average difference between the mind mapping learning method and the discovery learning method in students who have low physical strength.

Discussion

The purpose of the study was to determine the effect of the implementation of the mind mapping and the discovery learning method, in the groups of students who have the high physical skill and the groups of students who have low physical skills, on the learning outcomes of kick sports volleyball (soccer, headings, services, and smash). The findings reveal that there are differences in the learning outcomes of kick volleyball sports taught by the two learning methods, where the mind mapping is more influential on the learning outcomes of the basic techniques of kick volleyball for students who have high physical skills (explosive power of leg muscles) than discovery learning method. However, for students who have the low physical ability, there is no different effect on kick volleyball learning outcomes between mind mapping and the discovery learning method. The following result is the effect of interaction between learning methods and physical skills on the learning outcomes of kick volleyball.

The results of the first hypothesis indicate that the value of kick volleyball sports learning outcomes of the mind mapping for students who have high physical strength skills of leg muscle is higher than the discovery learning method group with the same physical skill. It means that the reciprocal learning methods for students who have top physical skills are better than discovery learning methods. The findings refer to the results of the previous

studies on mind mapping learning methods that state that skill performance improve in different-aged learners across various motor tasks when practicing under the conditions of style C (Ernst and Byra 2018; Goldberger and Gerney 2016; Mosston and Ashworth 2002; Pellett and Harrison 2015), and the important role of physical skills possessed by students explained by Fleishman (2014) because the abilities are part of individual traits that affect their ability to become skilled when learning new movement tasks.

The results of the second hypothesis state that there is no difference in the effect of mind mapping and the discovery learning method in students who have low physical exploitation power of leg muscles. The results refer to the findings of Puspitorini and Tangkudung (2016), who state that the students who have low abilities in the learning process are less potential in acquiring complex motor skills. By having low physical muscle strength (exploitative power of the limbs), students will be slow in doing movement skills in kick volleyball. Golubović and Bratić (2014) state that one of the reasons for making mistakes in learning movement skills is due to a lack of motor skills. In the discovery learning method, the results of Thomson's research (2010) suggests that the discovery learning method has a lot of repetition that students choose and will spend a lot of energy. In the field, researchers found that repetition often made many students exhausted in the group with low physical skills. In the mind mapping style group with low physical skills, actors and observers often create emotional situations as both have difficulties in implementing the role in learning the motion of kick volleyball sports. Based on the results of the study, the two groups of learning methods with low physical skills do not have different effects.

The results of the third hypothesis, through the calculation of analysis of variance, show that there is a significant interaction effect between learning methods with physical skills on the learning outcomes of kick volleyball. It is supported by the results of the research by Ianovici and Weissblueth (2016) who states that when students are given the right learning tools that following their level of motor ability, their performance and motor performance automatically increase. The interaction between the two can be seen in the difference in the effect of the treatment on the learning outcomes of basic techniques at both levels of student motor skills. Thus, it can be explained that the learning outcomes of kick volleyball, apart from being influenced by the learning methods used, are also influenced by the contribution of other internal factors, which include the physical skills of the students. It means that the mind mapping and discovery learning method will be better implemented by considering the physical skills (exploitative power of leg muscles) of the students for optimal learning outcomes. The interaction between learning methods and the physical skills was also found in the results of research on learning outcomes of other basic sports techniques, such as volleyball (Rohyana 2016), soccer (Doli, Akhmad, and Sunarno 2018), and speed-running (Sobarna 2017).



Conclusion

The results of the research are important for lecturers and physical education teachers in kick volleyball learning, especially in choosing the learning methods that will be used to improve the learning outcomes of kick volleyball sports. It is important for a teacher and a lecturer to consider the appropriate learning methods to achieve the goals of learning. Learning will be achieved if the learning methods used are following the characteristics of the students and the features of the material to be taught. The results of this study indicate that: 1) for students who have high physical skills, the mind mapping learning method is more influential than the discovery learning method on kick volleyball learning outcomes, 2) for students who have low physical skills, there is no different effect on the learning between mind mapping and discovery learning methods, 3) there is an influence of the interaction between learning methods and physical skills on the learning outcomes of kick volleyball. The results of the study can be accounted for scientifically.

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