

The Influence of Scientific Approach to the Ability of Solving the Movement Situation Problem of Invasion Game in the Teaching of Physical Education

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Abstract: The purpose of this research is to see the influence of scientific approach to the improvement of ability to solve movement situation problem of invasion game. The method applied in this study was the experimental method and the population was all students of class X IPA SMA Negeri 1 Nagreg. The samples of this research were 92 people who were taken using cluster assignment random sampling technique. Based on the testing and analysis results the use of scientific approach and conventional method has an influence on the ability to solve the problem of movement situation of invasion game in the learning of physical education. Based on the result of calculation in the experimental group obtained t-count of 7.942 and in the control group obtained t-count of 3.693 > t-table 2.015. The scientific approach has more significant influence than conventional method. Based on the calculation results, obtained t-count data was 11.552 > t-table 2.015., then H1 is accepted

1 INTRODUCTION

The ability to solve the movement situation problem is seen from the cognitive ability to the movement response or the movement response then the students think to solve the movement situation problem. Movement situation is the ability of how students are able to think to solve the motion tasks assigned by the teacher in the learning activities by training students to face various problems, whether they are personal or individual problems or group problems, to be solved individually or jointly in the form of sport games in the learning of physical education (Hendrayana and Widyawan 2016). Education through physical movement is expected to provide a real learning experience to students. Physical activity provides various contributions to the development of critical thinking skills, including both low-level thinking skills as, well as high-order thinking skills, especially to solve problems in the form of game activity.

In sport games, there are a lot of problems faced by a player to complete the movement tasks, especially in sport games. (Yigiter 2013) Problem

solving skill is defined as a cognitive-affective behavioral process through which an individual or group identifies or discovers effective means of coping with problem encountered in everyday living. For example, when a player carries a ball and encounters a tight guard from the opponent, the player must be able to decide what task to do, whether the ball should be dribbled or baited to another player. Then, when a player faces the problem of not being able to score, the player must be able to work together to utilize the space and use the tool so the purpose of the game can be completed, they can discuss to first determine the position for where they stand, which will later have their respective movement tasks in a game, especially in an invasion game where students have to solve various movement problems in the game to stimulate the ability to think fast and precisely in a game. (Harvey 2007) This unit invasion game aims to teach and assess both on- and off-the-ball skills. In soccer, players constantly need to make on-the-ball decisions about when to pass, dribble, or shoot. They also often have trouble deciding when to use which type of pass (e.g., push pass, instep pass, driven pass) and how hard they should kick the ball.

To achieve that goal, it is necessary to apply the learning approach in physical education, which apply the concept of learning by developing movement related to cognitive side to stimulate students to be able to think critically, one of which is by applying a scientific approach in teaching and learning activities. The scientific approach is a means or mechanism of learning to facilitate students to gain knowledge or skills by procedures based on a scientific method. The scientific approach is a scientific framework of learning promoted by the 2013 Curriculum. (Hidayat 2015) It is said scientific because the learning process should be based on evidences of an observable object, empirical, and measurable with the principles of specific reasoning. Therefore, the learning opportunity using scientific methods needs to be given to students to be able to understand why and how their bodies when displaying a mastery of invasion game in the learning of physical education. Then, the students are given the freedom to develop the cognitive side by solving the problems assigned by the teacher. Research conducted by (Tarigan, Hendrayana, and Wijawa 2017) states that scientific approach in physical education can improve creativity and physical fitness of junior high school students living on the coastal area. By using a scientific approach, it is expected to improve the ability of solving the movement situation problem in invasion game.

The steps on a scientific approach are a form of adaptation of scientific steps in science. "The learning process with the 2013 Curriculum in High School (SMA) that used a scientific approach had indeed a lot of features, other than improving the students' critical thinking skills, it also gave deeper practical experience regarding a symptom or a problem. (Said, Sutadji, and Sugandi 2016) Learning with a scientific approach is one of activities with more effective learning outcomes than traditional learning. The scientific approach model in the 2013 curriculum can be integrated and combined into several learning models, one of the learning models that can be integrated into science-based learning is the problem-based learning model. "Because the problem-based learning model is a learning model that is considered appropriate to solve the problem of motion in the game of invasion, (JR 2006) problem based learning as an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate

theory and practice, and apply knowledge and skills to develop a viable solution to a defined problem. (Senel, Ulucan, and Adilogullari 2015) problem based learning helps students to apply the knowledge they have in a meaningful way to solve problems that can occur in real-life situations. The problem-based learning model, in its curriculum, is designed to address issues that require students to gain important knowledge, make them proficient at solving problems, and have their own learning strategies and have the skills to participate in team.

The correlation of learning of the scientific approach with the ability to solve the movement situation problem in invasion game can be understood through the theory of cognitive development which is called Proximal Development Zone in forward (Schunk 2012) This concept is defined as the distance between the actual level of development determined through the independent problem solving and the level of development potential that is determined through problem-solving with the help of adults or by working with more capable peers. Therefore, the scientific approach with the problem-based learning model involves observation or observation activities required for the formulation of hypotheses or collecting data, thereby providing an opportunity for students to explore the knowledge that he has not known cognitively. In addition, the learning experiences from social environment are very important for learning and thinking because they are very influential on the outcome of his decision. The ability to solve problems related to this movement situation is oriented on cognitive abilities in relation to movement that can improve cognitive function and can develop critical thinking and involving many students in the learning process (Ak and Özkarde 2007) have said that in the classroom where problem- based learning is used, learners take much more responsibility for learning.

2 METHODS

The samples used in this research were 2 classes of 92 students, i.e. IPA class X SMA N 1 Nagreg. The samples were taken based on cluster assignment random sampling. The used research method was experimental method with pretest-posttest control group design (Fraenkel, Wallen, and Hyun 2012). The study took place from July 28 to

September 1, 2016, with a duration of 3 hours of lessons from 07.00 to 09.15 WIB according to physical education subject hours with the total amount of 12 meetings with 105 minutes / meetings, 2 times per week. Researchers used the instrument to solve the movement situation problem, the concept that is used according to (Abduljabar 2011) Movement situation problem solving is the ability to think analytically and action to the situation of movement problems in a game, so that players are at ease to do their game strategies. (Harvey 2007) The unit will also teach many of the teams of ballots, such as making decisions about what to do teammates when teammates when the opposing team has the ball (e.g., giving defensive cover to a teammate making a play on-the-ball or guarding / marking players and space). By that, the situation of movement in the invasion game includes; opening up the game room, facilitating the movement of friends, closing the opponent's danger movements, facilitating friends to "assist", standing in a favourable position, running to a profitable position, intercepting an opposing ball, helping / facilitating playmates. Instrument of this research is not yet standard, so there were validity and reliability tests to make the later gained data can be trusted.

Table 1: Research instruments.

Concept Definition	Sub Component	Indicator
(Abduljabar 2011)"Movement Situation Problem Solving is the ability to think analytically and action against movement situation problems in a game, so that players are at ease to do their game strategy."	1. Open the game room	a. Trying to find an empty or unattended place.
		b. Trying to ask for the ball.
		c. Trying to get out of guard.
	2. Facilitate the movement of friends	a. Move quickly and change direction to deceive the opponent.
		b. Trying to limit the movement of opponents.
		c. Protect friends who carry the ball by following them from behind or sideways.

Concept Definition	Sub Component	Indicator
	3. Close the opponent's danger movement	a. Closing the opponent's firing space.
		b. Slows the opponents' movement by blocking their movement pace.
	4. Facilitate friends to do <i>scoring</i> (<i>assist</i>)	a. Provide accurately directed assist to friends.
		b. Assist at the right time.
		c. Assist in empty space in front of the opponent/breakthrough feed.
	5. Stand in an advantageous position	a. To be in a position that is not guarded by the opponent.
		b. To be in a position to score.
	6. Run to an advantageous position	a. Run into the opponent's defense area to receive the ball of assists (<i>assist</i>) from friends.
		b. Run to a place that is not guarded by the opponent and ask for the ball.
c. Run closer to area for scoring.		
7. Intercept the opponent's ball throw	a. Take-over/cut the ball that will be transferred by the opponents	
	b. Prevent the opponents to transfer the ball	
8. Help/facilitate friends in playing	a. The players communicate actively in the field.	
	b. The players support each other in doing defense against the opponents.	
	c. The players support each other in creating attacks to score.	

3 RESULTS AND DISCUSSION

Table 2: Normality test of pre-test and post-test data calculations.

Test	Class	L _{count}	L _{table}	Conclusion
Pre-test	Control group	0.074	0.131	Normal
	Experiment Group	0.079	0.131	Normal
Post-test	Control group	0.099	0.131	Normal
	Experiment Group	0.110	0.131	Normal

Table 3: Homogeneity test of pre-test and post-test data calculations.

Test	Class	F _{Count}	F _{Table}	Conclusion
Pre-test	Control group	1.027	2.00	Homogeneous
	Experiment Group			
Post-test	Control group	1.755	2.00	Homogeneous
	Experiment Group			

Table 4: Test of t-test.

Class	T _{count}	T _{table}	Conclusion
Control Group	3.693	2.015	Significant
Experiment Group	7.924	2.015	Significant

The scientific approach method provided to the experimental group has a significant influence on the ability to solve the movement situation problem. This can happen because learning activity by scientific method using problem based learning model can create the learning environment as proposed by (Abdullah sani 2015) that "the scientific approach involves observation or observation activities needed for hypothesis formulation or collecting data, thus giving an opportunity to student to explore the knowledge that he or she has not known cognitively. "The problem-solving ability of this movement situation is based on cognitive ability in relation to movement. (Jr 2010) Problem-Based Learning was used to enhance cognitive thinking

while learning to develop physical fitness programs. The level of cognitive thinking is enhanced throughout the class participation as well as the motivation for learning more about physical education. Students are able to think critically, imaginatively, creatively and innovatively and are associated with problems related to movement situations, such as students are able to utilize space during the game, facilitate the movement of opponents, students are able to close the movement of the opponent, allowing friends to score (assist), standing in an advantageous position, running to an advantageous position, students are able to intercept the opponent's throw, and the students are able to help or facilitate friends to play.

The application of scientific method in the learning of physical education through invasion game helps students to improve cognitive function and can develop students' critical thinking. As noted (Abdullah Sani 2015) a scientific approach is used in learning because it can improve skills such as critical thinking, communication, collaboration, investigation and character behaviour. From the results of data processing and analysis, it is found that the use of scientific approach method has significant difference compared to learning by using conventional method. Although all hypotheses are accepted, there are however influence differences in significance level. The test proves a positive effect of the use of scientific method in the experimental group on the ability to solve the movement situation problem in invasion game.

In this study, the hypothesis of the same control group was accepted and there was a significant influence. This occurs because the researchers suspect that this control group learned with scientific process on other subjects, and there was less supervision from the researchers so that this control group can not be controlled because of the limitations for the researchers in terms of time, cost, and understanding of the scientific process.

4 CONCLUSIONS

Scientific approach is a learning approach with a scientific process. The model problem based learning is one of the learning models contained in scientific learning which greatly affects the improvement of problem solving ability of the movement situation, especially in invasion games. Learning with scientific approach and

conventional approach has an effect and there is improvement of problem solving ability of movement situation, but scientific approach has a more significant improvement since in learning with scientific approach, learners are directed to independently find facts, build concept, and solve problems as needed for their lives. The focus of the learning process is aimed at the development of students' skills in processing knowledge, finding and developing needed facts, concepts, and values independently.

By that, the two learning models are influential, between the learning groups that used a scientific approach with the group that did not use the scientific approach in their study, to the ability to solve the movement situation problem in invasion game.

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