The Scientific Approach Using Inquiry Learning Model in Improving Forehand Drive Performance of Table Tennis

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Abstract. This study aims to test an increase in the ability of a forehand drive in the game table tennis through the implementation of a scientific approach using inquiry learning model for one of Junior High Schools in South Sulawesi, Indonesia. This study applied a classroom action research conducted in two cycles. Each cycle consists of four steps, they are Planning, Implementation, Observation, and Reflection. Seventeen male students and eight females were involved as respondents in this study. Data collection techniques were conducted in the form of field observations and documentation. This study found that the ability of the forehand drive of Junior High School students increased significantly from cycle I to cycle II. Learning outcomes in the first cycle in the complete category was 44%. In the second cycle, an increase in student learning outcomes in the complete category was 80%. Thus, learning table tennis he through scientific application using inquiry learning models can improve the ability of students' forehand drive.

Keywords: scientific approach, inquiry learning model, *Forehand drive.*

INTRODUCTION

Table tennis is a game that uses a table as a field that is bounded by a net that uses a small ball, and the game uses a bat (Fuchs et al., 2018). Table tennis is a game where a small ball is beaten back and forth until someone makes a mistake (Zhang, Zhou, & Yang, 2018). Table tennis can be made as a recreational sport and can also be a sport of achievement (Naderi, Degens, Rezvani, & Shaabani, 2018; Naderi, Zagatto, Akbari, & Sakinepoor, 2018). This has the meaning that if as a recreational sport, table tennis is only a filler of leisure time when someone is at work, vacation time, and the rainy season. Meanwhile, as an achievement sports, it means that we must practice learning and understanding various types of basic shots and mastering various types of games.

Table tennis game is one of the sports types that is very popular in the community (Ma, He, & Yu, 2019). Table tennis is popular for both the lower and upper classes, and in the village and the city. Table tennis is fast spreading in all corners of the region since this game is considered by ordinary people to be a recreational sport to fill leisure time, achievement sports, educational tools and social media. Table tennis game has many features, such as it can be played by all levels of society ranging from children to adults,

both men and women, does not require a large space, the equipment used is lightweight and easy to obtain, the equipment also varies in price so affordable by the society.

Table Tennis has been included in the basic competence materials for physical sports and health education subjects in some Junior High Schools in Indonesia (Sihombing & Dewi, 2019). Indicators in the basic competencies are students have the ability in basic movements in table tennis. At the school, table tennis game became one of the sports of choice for students. This can be seen from the enthusiasm of the students if they take physical education, sports and health lessons more specifically learning table tennis materials. But with the attention of these students cannot be a guarantee that they can play table tennis well. Therefore, the researchers made initial observations in advance to see the basic abilities of students in playing table tennis.

Many students have difficulty in doing the forehand movement in table tennis (Han, 2019), hence it requires movement modification (Sekiya & Tanaka, 2019), such as in Table Tennis learning. Students seem to have lack of knowledge about playing table tennis. Students seems to have lacked confidence in making a forehand drive. From the initial observation activities, the researchers found that only twelve percent of students received the "complete" category in school's sample with a grade of 75 in accordance with the minimum criteria of mastery learning. The results obtained indicate the low knowledge, attitudes and abilities of students in learning table tennis, especially forehand drive.

The low results obtained by students on table tennis since this game as the basic competence of this small ball game is just applied. It seems to lead students having the lack of understanding and ability toward elements of a supportive movement. Disperser of student learning problems are from internal and external factors. The internal factors are such as the enthusiasm in physical education learning material (Chenchen, Rong, & Shuaijing, 2019). The external factors are the family and the surrounding environment which can be in the form of teachers, the environment, material, media, teaching learning models used by teachers (He & Li, 2018).

The success of students in teaching and learning activities depends on the teacher in choosing a learning model used in learning (Bonwell & Sutherland, 1996; Levitt, 2002), including in table tennis, especially in the forehand drive. Considering how big the role of a teacher on the success of students in understanding the tasks of motion, it is necessary to seek an alternative or way out to achieve basic competence in learning table tennis, especially forehand drive material in Junior High Schools of South Sulawesi, Indonesia.

The learning activities in the 2013 curriculum are directed to maximize all the potential possessed by students (Boleng & Rahayu, 2016), so that they can have the competencies expected through efforts to grow and develop attitudes, knowledge, and skills. In the 2013 curriculum, there are also active students to search, process and use knowledge, while the teacher is a good facilitator. Therefore, an educator must be careful in finding a teaching learning model that fits the 2013 curriculum. In accordance with the graduation competency standard, the learning objectives include the development of the areas of attitude, knowledge, and skills that are elaborated for each education unit. The three competency domains have different acquisition trajectories. Attitudes are obtained through the activities of receiving, running, appreciating, living, and practicing. Knowledge is gained through the activities of remembering, understanding, applying, analyzing, evaluating, creating. Skills are obtained through observing, asking, trying, reasoning, presenting and creating activities. From the differences in the acquisition of these competencies, the scientific approach needs to be strengthened by applying the discovery/inquiry-based learning model (Hosnan, 2016).

Based on the explanation above, the efforts made to improve students' abilities are by applying a scientific approach to the inquiry learning model. The scientific approach is intended to provide understanding various materials using a scientific approach. The inquiry learning model could develop the ability to think systematically, logically, and critically, or develop students' intellectual abilities, including in Sports (Riehl, Dannemann, Zetzsche, & Maiwald, 2019). The use of a scientific approach to the collaborative inquiry learning model can spur students to think critically and analyze the various materials available from various sources. Students are trained and encouraged to solve problems using a scientific approach. The application of a scientific approach to the inquiry learning model in this study is expected to improve student learning outcomes. Based on the problems described previously regarding the low

ability of forehand, the authors are interested in conducting Classroom Action Research (CAR) because teachers on physical education are reflective practitioners and action researchers (Maksimović & Jelena, 2018). This study aims to find out the increase in forehand drive ability in the game of table tennis by applying a scientific approach using the inquiry learning model of Junior High School Student.

METHOD

This research was conducted in one of Junior High Schools in South Sulawesi, Indonesia. Twenty-five students involved in this study were chosen purposively that consist of seventeen male and eight females. This study applied Classroom Action Research (CAR). Classroom action research (CAR) is research initiated to solve problems in teaching and learning in class directly (Mettetal, 2002). Classroom Action Research is an examination of learning activities in the form of an action, which is deliberately raised and occurs in a class together. The action is given by the teacher or with direction from the teacher done by students.

Classroom Action Research is a study that describes the occurrence of cause and effect from the treatment, as well as describing what happens when the treatment is given, and describes the entire process from the initial treatment to the impact of the treatment (Johnson, 2012). Based on the above opinion it is clear that classroom action research is an act that is deliberately raised and occurs in a class together, which aims to improve the ability of teachers to carry out assignments, and improve the conditions of learning practices that have been done to solve problems in the classroom (Farias, Hastie, & Mesquita, 2018). There are some experts who propose a classroom action research learning model with a different learning model, but in general there are four stages that are commonly passed, namely, planning, implementation, observation, and reflection (Putman & Rock, 2016), as in the Figure 1 below.
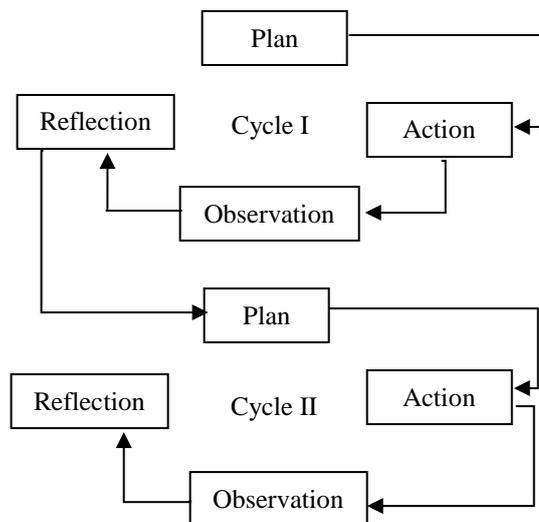
Figure 1. Action Research Cycles Model

The details of the Classroom Action Research are as follows:

- Plan is the stage in which it explains what, why, when, where, by whom, and how the research was conducted.
- Action is the stage of implementation or implementation of plans that have been prepared at the previous planning stage.
- Observation is an observation phase which is carried out during the research.
- Reflection is the stage of re-disclosure of the results of observation and evaluation in the application of actions in discussion, so that it can be used to design a research program in the next cycle.

The steps of the implementation of CAR in the procedure in this study is carried out for two cycles, each cycle is a series of interrelated activities. This means that the implementation of the second cycle is a continuation and improvement of the implementation of the first cycle as well as the next cycle. For data collection in this study carried out by field observations, and

documentation. Observation is carried out during the learning process consists of three aspects to be observed and assessed, namely attitudes, knowledge, and skills. Documentation is an activity or work process of recording or recording activities that are considered important to provide a description of the situation carried out in the learning process. The document is in the form of photographs and videos. Data collected at each observation activity from the implementation of the CAR cycle were analyzed descriptively using a percentage technique to find out trends occurring in learning activities (Putman & Rock, 2016). In this study, the analysis is done by grouping the data obtained through observation then presented after that for completeness learning is calculated using simple statistics. This research is said to be successful if the results of the ability of *Forehand Drive* students through applying the scientific approach using the Inquiry learning model reaches the minimum criteria of mastery learning in the school. Minimum criteria of mastery learning of Junior High School for

table tennis material, namely 75 is adjusted to the national minimum criteria of mastery learning. It means that each student is targeted to obtained at least 75 score.

RESULTS AND DISCUSSION

Results

Description of Initial Condition (Pre-Cycle)
Before carrying out the action, the researchers and the observers take the initial research data. This is intended to find out the initial conditions of the classroom conditions in the table tennis game material for Junior High School student. The description of the data taken is the ability of forehand drive in table tennis game for Junior High School student. The initial conditions of the forehand drive ability of students before being given an action with a scientific approach to the inquiry learning model are presented as in Table 1 as follows:

Table 1. Initial ability results of *Forehand drive*.

No	Score range	Indicator	Notes	Frequency	Percentage
1	93 – 100	Very good	Complete	0	0%
2	84 – 92	Good	Complete	0	0%
3	75 – 83	Fairly good	Complete	3	12%
4	<75	Poor	Incomplete	22	88%
	Total			**25**	**100%**

Based on the Table I above, the initial observation before being given an action indicates that twelve percent of students achieved minimum criteria of mastery learning and the remaining eighty eight percent of students failed the minimum criteria of mastery learning. Then an action was taken to improve the quality of the ability of forehand drive in the table tennis game through the application of a scientific approach using the inquiry learning model. The researchers

planned as many as two cycles, each consists of four stages (plan, implementation, observation, and reflection).
The Results of Cycle 1
Qualitative and quantitative data from the value of the end of the first cycle of increasing the ability of forehand drive students of Junior High School can be seen in the following Table 2.

Table 2. Observation results of cycle 1 on *forehand drive* ability of Junior High School student

No	Score range	Indicator	Notes	Frequency	Percentage
1	93 – 100	Very good	Complete	0	0%
2	84 – 92	Good	Complete	2	8 %
3	75 – 83	Fairly good	Complete	9	36 %
4	<75	Poor	Incomplete	14	56 %
	Total			**25**	**100%**

Table 2 above shows the results after carrying out the inquiry learning model at the second meeting. Table 2 above shows that the ability of students' forehand drive was zero percent a very good, eight percent on a good, thirty-six on a fairly good, and fifty-six percent on a poor scale. So, at this meeting there were already forty-four percent of students in the complete category and fifty-six percent of students were in the incomplete.

So, it can be concluded that the students' ability on forehand drive in cycle 1 that has been done in research activities has improved after applying a scientific approach on inquiry learning models. However, it has not met the maximum standard of students' ability on forehand drive as expected by achieving a good standard target category or seventy-five percent and above. The percentage of completeness obtained in the first cycle was forty-four percent who achieved 75 score. Thus, the second cycle needs to be done by improving the processes that have been implemented in the first cycle.

The Results of Cycle 2

The students' score from the cycle 1 to the cycle 2 shows the increase on forehand drive ability as in Table 3 below.

Table. 3. Observation results of students' forehand drive ability on the second meeting in cycle 2

No	Score range	Indicator	Notes	Frequency	Percentage
1	93-100	Very good	Complete	0	0%
2	84 – 92	Good	Complete	6	24%
3	75 – 83	Fairly good	Complete	14	56%
4	<75	Poor	Incomplete	5	20%
	Total			25	100%

Based on the data above in the second meeting of cycle 2 shows the increase of the students' ability on forehand drive. There were twenty-four students in good scale, fifty-six students in fairly good, twenty percent of students were in a poor scale. So, at the second meeting of the cycle 2, the results obtained were eighty percent of students obtained 75 score and above achieved complete and twenty percent achieved score below 75 (Not Completed). Indicators of research success that have been determined in this study have been achieved. In this case, eighty percent of the students have received a minimum grade of 75 (Good). Therefore, from this study, it can be concluded that the ability of students' forehand drive can be increased using the inquiry learning model as a scientific approach.

Discussion

The Classroom Action Research in this study applied a scientific approach using inquiry learning models to improve the students' ability on forehand drive. On the preliminary research (before cycle 1), the researchers prepared the things that are considered necessary in the implementation of the cycle 1, namely preparing the observation sheet, making lesson plans, and preparing table tennis equipment. In this study, twenty-five students attended it. The implementation of the cycle 1of meeting 1 and 2 based on the phases in the inquiry learning model, namely presenting introductory material, observing media given either in the form of LCD or non-LCD. This step also applied giving opportunities to ask questions, doing reasoning activities, formulating problems to be solved, formulate hypotheses, conduct experiments and collecting data in groups, analyze experimental data, test hypotheses, and draw conclusion from experiments that have been conducted, students communicate their work and other students' responses. Based on observations and evaluations in the first cycle, the results of the students' ability on forehand drive have not reached the predetermined success indicator that is seventy-five percent of students who reached 75 and above score. The percentage of completeness obtained in the first cycle was forty-four percent who completed twenty-five students. This is because there are difficulties experienced by students during learning as follows: (a) Students do not understand when doing forehand drive, which is at the time of attitudes; (b) Students focus too much on the wall so that the element of motion is ignored; (c) Difficulties experienced due to student understanding is still lacking in the process of forehand drive movements and

students are not familiar with the learning model provided because so far students are accustomed to teacher-centered learning models.

In line with the opinion of Hosnan (2016), which states that inquiry learning is hampered in running learning because of students' learning habits. The habit of students so far in learning is to receive information directly from the teacher, it contrasts with inquiry learning where students try to get information about the problems encountered. In the theory of constructivism, knowledge is not an imitation of reality (McCourt, 2016). Knowledge is the result of a cognitive construction through one's activities (Mani & Milan, 2020). In this case, students form the schemes, categories, concepts, and structures of knowledge needed. Knowledge is not about the world that is free from observation or the world it experiences. Furthermore, knowledge cannot be transferred from one's brain (teacher) to another person (students). But students themselves must interpret and digest in such a way the materials have been taught, and students adjust to their experiences.

Based on the theory above in understanding the materials delivered by the teacher, students must be able to develop their thinking abilities so that students solve the their explicit problems (Nonis & Hudson, 2019). Therefore, in the next cycle, the researchers tried to provide more interesting materials for students, such as giving a video about how the forehand drive process and varying the previous game. This is done as an effort to make students feel motivated in finding and understanding the problems or difficulties they face. Based on observations on the implementation of the cycle 2 of action showed that the students' ability of forehand drive increased. There were eighty percent who reached complete indicator and twenty percent who obtained complete indicator.

From the overall data obtained, the conclusion about the forehand ability of students using inquiry learning shows that the initial data of students' forehand ability is twelve percent who are in the good category and above. This has increased in cycle 1 that is twenty-percent of students get 75 score. In the second meeting of the cycle 1 obtained forty-four percent complete by getting at least 75 score. Furthermore, in cycle 2, the results obtained are eighty percent of students scored 75. Indicators of research success that have been determined in this study have been achieved. Based on the results of planning, implementation, observation, evaluation and reflection, it was concluded that this study was successful, namely by achieving indicators and answering research hypotheses, namely the application of a scientific approach using inquiry learning models can improve the students' ability of forehand drive. The results of the above research are in accordance with the opinions expressed by Handayani (2016) that this learning model seeks to teach students to recognize problems, formulate problems, find solutions or test answers while on a problem/question by conducting an investigation (finding facts through sensing), in the end can draw conclusions and present them verbally and in writing. In line with the opinion of Hosnan (2016) that inquiry learning emphasizes the development of cognitive, affective, and psychomotor aspects in a balanced manner, so that inquiry learning is considered to be more meaningful. Inquiry teaching comprises the process of teacher guidance and students enquiry that requires space to develop, and encourage students in doing problem analysis, data collection, cooperation, and independent learning (Jia, 2019). The inquiry-based learning was implemented successfully in the modules for the sports and movement sciences areas (Riehl et al., 2019).

Furthermore, the implementation of the 2013 Curriculum in learning with a scientific approach is a learning process that is designed in such a way that students will actively construct concepts, laws, or principles through the stages of observing, asking, trying, reasoning, and communicating. Based on the above theory it can be concluded that in the learning process students must be active in finding information in accordance with the problems faced, thus encouraging students' ability to bring out their creativity. Similarly, Handriani, Harjono, and Doyan (2017) revealed that a scientific approach can provide opportunities for students to actively participate in the learning process. Students who learn to find their own concepts of knowledge will gain more meaningful experiences and knowledge more strongly embedded in their memories. With the strong information inherent in student memory, it will certainly also affect the acquisition of student learning outcomes. Therefore, for the use of a scientific approach using inquiry learning models can be used as a learning model in improving the ability of students' forehand drive hits on tennis material.

CONCLUSION AND SUGESTION

Indicators of research success that have been determined in this study have been achieved. In this case eighty percent of the students have received a minimum grade of 75 (Good). Therefore, from this study, it can be concluded that the student's ability of forehand drive students can be improved by applying a scientific approach of inquiry learning models. Based on the results of the study, it can be suggested a number of issues, especially for teachers of Junior High School that teachers should apply a scientific approach using inquiry learning models in the learning process especially in table tennis materials. Also, teachers should provide modification of simple learning tools, efficient, effective, which can be seen or held directly by students because it can motivate students to always try and repeat continuously.

To improve the forehand ability of junior high school students, this inquiry learning method is provided to all students at the research location. Teachers can make a role model of learning application for all subjects and school leaders issue a policy to use the learning models needed in accordance with current developments.

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