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Implementation of the Inquiry Model on the Critical Thinking Ability of Prospective Physical Education Teachers in Football Learning

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Abstract

Physical education is not just about learning skills from several basic techniques in sports including football. Currently, football needs to be supported by critical thinking skills to produce a more focused and efficient game. The aim of this research is to implement an inquiry learning model on students' critical thinking skills in the game of football in the aspects of maintaining possession of the ball, creating space in attack, and shooting the ball into the goal. The method used was an experiment with The Randomized Posttest-Only Control Group Design. The total sample was 70 students divided into two groups, namely the experimental group of 35 people who were given inquiry model treatment and the control group of 35 people who were given conventional model treatment. The instrument for measuring critical thinking skills uses an observation sheet whose level of validity has been tested. The results of the research show that students' critical thinking abilities for the inquiry model in football learning in the aspect of maintaining possession of the ball are in the very good category, while for the conventional model in this aspect they are in the good category. Students' critical thinking skills for the inquiry model for the aspect of creating space in attack are in the very good category, while for the conventional model in this aspect they are in the good category. Students' critical thinking skills for the inquiry model in the aspect of shooting the ball into the goal are in the very good category, while for the conventional model in this aspect they are in the good category. The application of the inquiry model for students as prospective physical education teachers in order to improve critical thinking skills in football game material has a significant impact.

Keywords : *Instructional Model, inquiry, critical thinking, football*

INTRODUCTION

This rationale based on the value of science education for individuals and society makes a lot of sense in an age where sustainable lifestyle choices and adherence to public health advice are critical to everyone's survival. Additionally, living in an era of 'fake news' where expert evidence and opinions are often treated with suspicion, having critical skills and the ability to think scientifically is also important (McCullagh & Doherty, 2021). The Confederation of British Industry recommends that science should be introduced at primary level to foster interest in students from an early age. Harlen (2014) identified how inquiry-based approaches naturally align with the way children learn by enabling them to use their own ideas to understand new events and phenomena. The benefits of an inquiry-oriented

learning approach bring benefits beyond science education. The curiosity and purpose built by appropriately designed inquiry activities provide engagement and motivation for even the youngest learners to begin learning about learning (Harlen, 2011). In an inquiry rubric, it is engagement with activities and assignments that develops students' skills. Furthermore, these tasks provide personal context and experience to reflect on the goals of the activity, discuss progress and consider the opinions and feedback of others. This metacognitive thinking allows for greater personal independence and learner autonomy. Inquiry-based science learning also provides opportunities for developing students' personal abilities and thinking skills (Muphy et al. 2013).

Science education policy reform and a shift in curricula toward more student-centered learning require changes in classroom pedagogy. Qvortrup (2008) noted in the first Global Education Forum that the quality of teacher training is the most important determining factor in the quality of education and also the efficiency and quality of student learning. Osborne, J. and Dillon, (2008) critical reflection on the state of science education in Europe recommends a greater focus on extensive investigative work and hands-on experimentation, accompanied by high-quality professional development for teachers. Wilson (2013) called for carefully designed professional development programs in the US in response to the introduction of the K-12 Science Education Framework (National Research Council, 2012).

Inquiry-based teaching is ubiquitous in science education research and practice, with many national curricula promoting and implementing inquiry practices in the classroom. One reason for the widespread adoption of inquiry practices is the belief that they can empower students and improve the quality of teaching. Moreover, inquiry practices in the classroom reflect those of working scientists (Bjønness, B., & Kolstø, 2015; Cairns, D., & Areepattamannil, 2019). It is true that much research has studied the role and potential of inquiry as a basis for quality teaching in science education (Estrella, et al., 2018; Furtak et al., 2012; Teig, 2021).

Inquiry-based teaching has established itself as a broad tradition in science education, taking different forms in different contexts. Nevertheless, there are elements common to most models of inquiry, including students wondering, asking questions, gathering information, investigating, observing, interpreting, discussing, and formulating explanations based on evidence (Barber, 2009; Crawford, 2014; Teig, N., Scherer, R., & Nilsen, 2018).

(Our framework assembles these elements into three distinct phases of inquiry (preparation, data collection, and consolidation).

Prospective physical education teacher students need to be equipped with a multitude of competencies as a basis for teaching after graduating with a bachelor's degree. Students must take several courses, such as learning curriculum, learning planning, learning models, sports tests and measurements, as well as physical education learning evaluation. The application of teaching materials will be more systematic when using one of the learning models in the classroom. Of course, the model has its own syntax according to the priority of learning objectives. The application of the inquiry model in physical education, especially in football game material, is very limited, in fact the results of research on the use of this inquiry model are very limited. In fact, if you look at the essence of the game of football, not only being proficient in aspects of technical skills and strategic maturity, the ability to think critically, accuracy in decision making, the ability to analyze the game, combining the right technical factors (synthesis) during the game are things that are urgent for a player to have. football. To be able to score a goal, a player or team needs to be supported by several indicators such as being able to maintain control of the ball, creating opportunities to attack and shooting the ball into the opponent's goal. The inquiry model allows students to learn to think systematically by recognizing the characteristics of football first during the game, formulating problems that often arise in the game, formulating temporary answers (hypotheses) to the problem questions posed, the process of collecting data from football learning activities that are being carried out. , testing hypotheses by interpreting findings during learning activities, and drawing conclusions from all series of teaching materials based on experience during the learning process (Kersting et al., 2023).

Critical thinking skills are one of the skills that every student needs to have so as not to be left behind in increasingly tight world competition. Various efforts to train and improve students' critical thinking skills are carried out through various learning methods and media (Risma, Nur, Siahaan, & Samsudin, 2015). Implementation of the inquiry model in learning for prospective physical education teachers as a stimulus to form critical thinking skills needs to be done. The implications of learning outcomes using the inquiry model are expected to have an impact on students' mindsets in order to prepare prospective physical education teachers who have competence and competitiveness. Some research literature that examines the application of the inquiry model in physical education, especially in

football material, is very limited, therefore the aim of this research is to apply the inquiry model in order to examine students' critical thinking abilities.

METHOD

The research we conducted was an experiment with The Randomized Posttest-Only Control Group Design (Jack R. Frankel., Norman E. Wellen., 2012). The design plans can be seen in the following table:

Table 1. Research Design

Treatment Group	R	X	O
Control Group	R	C	O

The research was carried out at the STKIP Muhammadiyah Kuningan campus in the Physical Education, Health and Recreation (PJKR) Study Program, as one of the outcomes of the learning models course in the even semester of the 2022/2023 academic year, to be precise from March to May 2023. The location selection was based on research needs and have also received recommendations from authorized campus leaders.

The total number of students in the fourth semester of the PJKR Study Program was 127 students who were divided into five classes (classes A, B, C, D, and employee class), while the research sample was taken randomly from two classes. The results of the drawing for each class showed that the experimental group was the PJKR 4 B class with 35 students and the control group was the PJKR 4 A class with 35 students.

Two groups in the research, both experimental (inquiry model) and control group (conventional model), were given a learning scenario of the same material, namely a football game, with different syntactic content according to the characteristics of the model applied before being given treatment. The lectures for the experimental group of 35 PJKR 4 B students used the inquiry model starting with preliminary activities such as attendance, presentation of learning objectives by the lecturer, and warm-up specifically aimed at the learning objectives of the game of football.

Entering the core stage of learning, students carry out soccer game activities using inquiry model syntax including; 1) Orientation stage, where students are introduced to the material being studied, namely the game of football, such as basic techniques for passing, dribbling, shooting, heading, and game situations. 2) Problem formulation, students are faced with a technical or tactical problem in the game of football. For example, how do you score a goal

against your opponent's goal, while in the goalkeeper area the player's guard is very tight? 3) Formulate a hypothesis, at this stage students are trained in the ability to provide temporary answers to questions regarding the material being studied. Students provide an explanation of how to escape from the tight pressure in the goalkeeper's area so they can shoot the ball into the opponent's goal on target. 4) Collecting data, in this stage students carry out learning activities based on the learning scenarios that have been created. Repetition of appropriate tactics and application of techniques in creating opportunities to score goals continues to be carried out to ensure students obtain authentic data and information based on findings in the field. 5) Testing hypotheses, at this stage students are trained in the ability to think rationally from what they find based on the learning experiences being studied. The data and information that has been collected from several indicators of learning outcomes is shown, such as how to free yourself and your team from the pressure of opposing players in the goalkeeper area to make it easier to shoot the ball towards the goal target accurately, so that the opportunity to score a goal is more promising. 6) Formulating conclusions, students describe the findings that have been obtained based on the results of hypothesis testing. At this stage, students provide conclusions about several ways to score goals both individually and as a team, and how to release tight pressure from opponents in the goalkeeper area. The closing activity ended with a reflection where the lecturer and students evaluated the series of learning that had been carried out, cooled down, and ended with prayer.

The implementation of conventional model learning scenarios was given to 35 PJKR 4 A students as the control group. The preliminary stage is the same as the experimental group, namely the lecturer carries out a percentage, conveys learning objectives, and warms up typical of a football game. In implementing the core learning, of course the conventional model has its own syntax, such as; 1) Study the history of football. 2) Learn the rules of the football game. 3) learn basic dribbling techniques. 4) learn basic passing techniques. 5) learn basic shooting techniques. 6) learn basic heading techniques. 7) Study the dominant physical conditions required in the game of football, and 8) Study football tactics. The closing activity is the same as that carried out by groups that use the inquiry model, namely carrying out reflection as an evaluation of the learning series from beginning to end, cooling down, and ending with prayer. The number of meetings between the experimental group and the control group was the same, namely eight meetings.

The experimental group and control group were the same, namely eight meetings.

The assessment process is carried out after the treatment is complete. Measurements were carried out on all sample groups using observation sheets to obtain students' critical thinking skills from learning the game of football. Obtaining data on students' critical thinking abilities, the researcher made a checklist sheet for each indicator of critical thinking abilities consisting of: 1) Analysis ability, 2) Synthesis ability, 3) Problem solving ability, 4) Conclusion ability, 5) Evaluation ability. To make it easier to determine the achievement of students' critical thinking skills in learning the game of football, the final process is to calculate the percentage of critical thinking ability achievement using the following formula:

$$T = \frac{T_i}{T_s} \times 100\%$$

Information:

T : Achieving critical thinking skills in learning

Ti : Number of research samples that achieve critical thinking skills

Ts : Number of research samples

The next step, after the data is presented, is to classify the percentage of achievement of students' critical thinking skills in both the group using the inquiry model and the conventional model group. The criteria for the critical thinking ability category are presented in Table 2 below.

Tabel 2. Critical Thinking Ability Category Criteria

Score Intervals	Classification
80% < T ≤ 100%	Very Good
60% < T ≤ 80%	Good
40% < T ≤ 60%	Enough
20% < T ≤ 40%	Not Enough
0% ≤ T ≤ 20%	Very Less

Source: Riduan (2010)

Obtaining data from measuring students' critical thinking abilities is of course processed and interpreted in order to obtain clear, valid information. The data analysis technique used is the independent sample t test to see the difference in the means of two groups from the application of the inquiry model and the conventional model.

RESULT

Based on data processing and analysis, the results of the critical thinking skills of 35 students in the inquiry learning model group and 35 students in the conventional model group of learning football material in the learning model course can be interpreted in the following table:

Table 2. Descriptive Analysis of Students' Critical Thinking Ability in Football Games Using the Inquiry Learning Model

	Maintaining Control of the Ball	Creating Space in Attack	Shooting the Ball into the Goal
Analysis	80	79	80
Synthesis	82	80	78
Problem Solving	82	81	81
Menyimpulkan	83	82	79
Conclude	83	80	80
Average	80	80	80
Category	Very Good	Very Good	Very Good

Based on table 2 above, it can be explained that students' critical thinking abilities use the inquiry model in learning the game of football with goal scoring material which consists of several indicators to obtain results; 1) maintaining control of the ball from the analysis aspect obtained a score of 80, synthesis 82, problem solving 82, concluding 83, and evaluation obtained a score of 83, so the average score in maintaining ball control was 80. From the average score, the ability to think critically students in maintaining control of the ball are in the very good category. 2) creating space in attack seen from the aspect of analysis getting a score of 79, synthesis 80, problem solving 81, concluding 82, and evaluation getting a score of 80, so the average score of creating space in attack is 80. From the average score, the ability Students' critical thinking creates space to attack and is in the very good category. 3) shooting the ball into the goal from the analysis aspect gets a score of 80, synthesis 78, problem solving 81, concluding 79, and evaluation gets a score of 80, so the average score in shooting the ball into the goal is 80. From the average score, the ability to think Students' critical shooting of the ball into the goal is in the very good category.

The results of students' critical thinking abilities in the conventional model group in playing football were measured in the same way as those in the group of students who used the

inquiry model, namely maintaining control of the ball, creating space in attack, and shooting the ball into the goal. The difference is that the treatment given refers to the conventional model syntax consisting of passing practice, dribble practice, shooting practice, heading practice, and game situation practice. The results of students' critical thinking abilities in learning football on goal scoring material can be interpreted in the following table:

Table 3. Descriptive Analysis of Students' Critical Thinking Ability in Football Games Using Conventional Learning Models

	Maintaining Control of the Ball	Creating Space in Attack	Shooting the Ball into the Goal
Analysis	77	75	73
Synthesis	75	70	71
Problem Solving	72	71	72
Menyimpulkan	70	73	70
Conclude	73	75	70
Average	73	73	71
Category	Good	Good	Good

Based on table 3 above, it can be explained that students' critical thinking abilities use conventional models in learning the game of football with goal scoring material which consists of several indicators to obtain results; 1) maintaining control of the ball from the analysis aspect obtained a score of 77, synthesis 75, problem solving 72, concluding 70, and evaluation obtained a score of 73, so the average score in maintaining ball control was 73. From the average score, the ability to think critically students in maintaining control of the ball are in the good category. 2) creating space in attack seen from the aspect of analysis getting a score of 75, synthesis 70, problem solving 71, concluding 73, and evaluation getting a score of 75, so the average score of creating space in attack is 73. From the average score, the ability Students' critical thinking creates space to attack and is in the good category. 3) shooting the ball into the goal from the analysis aspect gets a score of 73, synthesis 71, problem solving 72, concluding 70, and evaluation gets a score of 70, so the average score in shooting the ball into the goal is 71. From the average score, the ability students' critical thinking in shooting the ball into the goal is in the good category.

DISCUSSION

Based on research findings from the application of the inquiry model to students' critical thinking skills in learning football, especially goal scoring tactics consisting of several indicators including maintaining possession of the ball, creating space in attack, and kicking at the goal. All of these indicators are interpreted with students' critical thinking

skills through analysis, synthesis, problem solving, making conclusions, and evaluating.

As a football team, everyone has the goal of scoring as many goals as possible against the opponent's goal, and preventing the opponent from putting the ball into our team's goal (Sucipto, Bambang Sutiyono, Indra M. Tohir, 2000). In the modern football era, possession of the ball has become its own characteristic, the team that wins more possession of the ball tends to control the game and become the winner (Karisman et al., 2021). By applying the inquiry model, students can better understand how to defend the ball as well as possible. Implementation of accurate passing techniques, effective support and proper ball control results in better ball control. In inquiry learning, students are equipped with systematic ways of thinking in solving tactical problems in the field (Mesnan, Supriadi, & Siregar, 2019). Through inquiry learning, students learn to know the game of football, formulate problems that often arise in order to score goals, formulate temporary answers to the problems posed (how to score goals), collect data and information by repeating movements, implementing basic techniques that are appropriate in situations, especially maintaining control of the ball, testing hypotheses by presenting answers and demonstrations of findings in the field, as well as making conclusions from the entire series of learning that has been carried out (McCullagh & Doherty, 2021).

The next indicator for scoring goals is how the team can create space in attack (Tarigan, 2001). Students learn directly contextually to create space by applying appropriate technical factors such as effective dribbling, support and overlap. Through the inquiry learning model, students are required to think systematically using scientific steps based on investigation, especially in creating space to attack. Students learn to analyze problems that often arise during the game, students can integrate relevant basic football techniques according to needs during the game. The game of football is so complex, players must always be able to solve tactical problems, when to pass the ball, when to dribble the ball, when to shoot the ball, not to mention under pressure from the opponent, and of course adapt to the right situation to make a decision. The ability to solve problems in the field hones students' critical thinking. The situation is difficult because all arenas are closely guarded by opposing players, students are required to make the right decisions in a very short time. Implementing the inquiry model can hone critical thinking skills in making decisions (Lin, 2016).

Learning the material on shooting the ball into the goal using an inquiry model, of course

students think in demonstrating the right technique according to the game situation. Students analyze, synthesize, and come to careful conclusions about opportunities to score goals by improvising when the opponent's goalkeeper's area is very tightly guarded, releasing shots at the goal with the right timing by looking at the situation and conditions that allow the ball to be shot, making decisions. accurate when the ball should be shot, or given to a partner in a more advantageous position to shoot the ball into the goal (Setia & Darmawan, 2018). The series of learning football material from start to finish, students have learning experiences both from cognitive, affective and psychomotor aspects. At this stage students can assess the effectiveness of learning the football game material they have studied. Overall, students' critical thinking skills using the inquiry learning model are in the very good category.

The results of students' critical thinking abilities in learning football using conventional models were also analyzed. The findings in the field are different from students who use the inquiry model. In the conventional model, students are presented with repetition of basic techniques such as passing with various variations and combinations, repetition of dribble techniques with various variations and combinations, repetition of basic shooting techniques with various variations and combinations, repetition of basic heading techniques with various variations and combinations, as well as game situations as evaluate the implementation of several basic techniques that have been learned. The results of critical thinking skills from applying the conventional model do not appear significant, because substantially the conventional model prioritizes improving psychomotor aspects (Metzler, 2000). Observations made on students using the conventional model were seen based on their critical thinking abilities being in the good category.

CONCLUSION

The application of the inquiry model for students as prospective physical education teachers in order to improve critical thinking skills in football game material has a significant impact. Students are able to analyze situations on the field, are able to combine understanding (synthesis) of several basic technical elements according to game situations, are able to solve technical and tactical problems, are able to make decisions and conclude based on findings in the field, and are able to evaluate the entire series of learning, especially in maintaining control of the ball, create space in attack, and shoot the ball into the goal in football games.

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