



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

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### Abstract

Currently, football needs to be supported by critical thinking skills to produce a focused and efficient game. This research aims to implement an inquiry learning model on students' critical thinking skills in football learning materials. The football learning material includes maintaining control, striking, and shooting the ball. The method utilized was an experiment with The Randomized Posttest-Only Control Group Design. The total sample was 70 students divided into two groups: the experimental group of 35 was assigned inquiry model treatment, and the control group of 35 was assigned conventional model treatment. The instrument for measuring critical thinking skills operates an observation sheet whose level of validity has been tested. The research results reveal that students' critical thinking skills for the inquiry models are an extremely good category, and conventional models in maintaining ball control are a good category. Students' critical thinking skills for the inquiry model for striking are in the extremely good category, while for the conventional model for striking are in the good category. Students' critical thinking skills for the inquiry model in the aspect of shooting are in the extremely good category, while for the conventional model in the shooting aspect are in the good category.

**Keywords:** Instructional Model, Inquiry, Critical Thinking, Football



## INTRODUCTION

John Dewey provided enlightenment in education to improve student learning outcomes that are meaningful through action. Inquiry allows students to explore various subjects teachers deliver using the student-centered model. The current inquiry-based teaching model in physical education is a breakthrough in the struggle to increase interesting and effective learning (Lynott & Bittner, 2019). Utilizing the inquiry model in physical education teaching allows critical thinking and motor skills to be performed sufficiently (Simonton et al., 2021). Inquiry-learning model experts provide varied arguments regarding the syntax and nomenclature in each stage (Goodyear et al., 2013). Inquiry-based learning for students is considered an effective teaching model due to active learning. Experts also argue that the inquiry-based learning stages are analogous to the scientific method and have the identical goal: answering a question empirically. The explanation of the stages of inquiry learning in this article is interpreted into four steps, namely: 1) clarifying the problem, 2) creating a hypothesis, 3) testing the hypothesis, and 4) developing conclusions (Ostergaard, 2016; Lynott & Bittner, 2019).

Explanation in the first stage is a clarification of the problem, and students are given questions prepared by the teacher or assisted in developing questions created by the students themselves. Inquiry-based physical education learning, specifically on football material, will encourage the student with critical thinking questions. For example, the teacher can ask, "How do you create striking effectively to produce a goal?" What is an effective way to defend when the rival controls the ball? How do we control the ball without being easily snatched by rivals? What is an effective way to open up the rival's defense?

Although the teacher will ask some questions for students who are less experienced in identifying a problem, questions the teacher determines have the potential to provide and model appropriate expectations for this stage.

In the first stage of this inquiry model (clarification of the problem), the physical education teacher should provide some direction. Teachers can prepare general topics for students to develop appropriate investigations easily. For example, a physical education teacher will provide material to students about defensive tactics and strategies in the game of football, so the instructions given are as follows: In this material, students will identify effective defensive tactics and strategies to develop in some questions, and then students will discuss the topic with other colleagues. Even though the teacher sets problem limits on

the investigated material regarding defensive strategies and tactics, students can investigate the aspects they are curious about. Whether the questions are teacher-determined or student-determined, the problem clarification stage results in students actively exploring, discussing, reflecting, and formulating questions that help focus their inquiry for the next stage (Ostergaard, 2016).

The second stage in learning using the inquiry model is formulating a hypothesis. In this stage, students try to answer the questions from the first stage as a guide in formulating hypotheses to predict the answers to the questions asked. The teacher coordinates the students' discussion regarding identifying initial predictions of question answers requested in class. In the second stage, the teacher advised using "if-then" questions to express the hypothesis. Examples of several hypotheses and predictions

- in the second stage: If your team is skilled in passing, controlling, and dribbling basic techniques, can your team master the game
- ? If your team is skilled at making tackles, blocking tackles, interceptions, and correct timing, can your team maintain a good defense against opponent attacks
- ? If your team is skilled at overlapping, long passing, penetration, and shooting on target, your team will easily create opportunities to create goals?

After students identify the hypothesis they have created, they determine groups based on the general hypothesis. Ostergaard (2016) describes this stage as a period when students can "compare and discuss suggestions, and create hypothesis or prediction." Students are encouraged to use prior knowledge and experience to support and formulate their hypotheses. In the first example, students are asked to reflect on material about team ball control and observe football games' influential basic technical aspects. The physical education teacher demonstrates students' video feedback from a football game when the team has ball control. Ideally, teachers can guide their students to formulate appropriate hypotheses. If a football team has all its players with excellent basic passing and control techniques, the game will be easy to master. For students with knowledge and experience in learning using the inquiry model, teachers should provide opportunities to share their knowledge with other students in formulating hypotheses. The second example of a correct hypothesis is: if the team's defensive players have the basic technical skills of tackle, block tackle, intercept, strong body balance, and good timing, then the defensive area will be safe from opponent attacks. The third example of a correct hypothesis is: if the team's

players have good basic long-passing technical skills, appropriate improvisation, accurate overlapping, and accurate shooting, then attacking the heart of the opposing player's defense will be more effective in creating goals.

The final stage in inquiry learning is developing a conclusion. In this stage, students attempt to synthesize all the data collected through the learning process through trials or research, direct observation, and concluding the proposed hypotheses. This conclusion is a hierarchical process from the initial question as the first stage of identifying, confirming, or rejecting the proposed hypothesis. It ends with a conclusion based on the results and findings of the learning process that has been implemented.

Several research results suggest that physical education provides a distinctive opportunity for students to be actively involved in learning and supports the development of cognitive and physical capacities (Ostergaard, 2016; SHAPE America, 2015; Whitehead, 2013). Inquiry-based learning effectively engages and develops students' cognitive competence in physical education (Ostergaard, 2016; Lynott & Bittner, 2019).

#### Physical education

teacher candidates must be prepared with many competencies for teaching after graduating with a bachelor's degree. They should take several courses, such as curriculum, planning, learning models, sports tests and measurements, and physical education learning evaluation. The systematic teaching materials concerning the learning models require the model's syntax according to the priority of learning objectives. The application of the inquiry model in physical education, especially in football game material, needs to be improved. The essence of the football game is more than merely being proficient in technical skills and strategic maturity. In that case, the capability of critical thinking, accurate decision-making, analyzing the game, and combining the right technical factors (synthesis) during the game is crucial for athletes. A player or team needs to be supported by several indicators, such as maintaining control of the ball, creating opportunities to strike, and shooting the ball into the opponent's goal to achieve a goal in football games. The inquiry model allows students to learn systematically by recognizing the characteristics of football first during the game, formulating problems, formulating temporary answers (hypotheses) to the problem questions posed, collecting data from football learning activities, testing hypotheses by interpreting findings during learning

activities, and concluding all teaching materials based on experience during the learning process (Kersting et al., 2023).

Critical thinking skills are one of the skills every student needs to have to stay caught up 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 et al., 2015). Implementing the inquiry model in learning for physical education teacher candidates as a stimulus to form critical thinking skills needs to be accomplished. The implications of learning outcomes using the inquiry model are expected to impact students' mindsets to prepare physical education teachers with competence and competitiveness. Some research literature that examines the application of the inquiry model in physical education, especially in football material, needs to be more extensive. Therefore, this research aims to apply the inquiry model to examine students' critical thinking abilities.

## METHOD

Our research was an experiment with The Randomized Posttest-Only Control Group Design (Jack et al., 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 conducted at the STKIP Muhammadiyah Kuningan campus in the Physical Education, Health and Recreation (PJKR) Program. The

total number of students in the fourth semester of the PJKR Study Program was 127, divided into five classes (A, B, C, D, and employee class). The research sample was taken randomly from two classes. The drawing results 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.

The experimental (inquiry model) and the control group (conventional model) were provided a learning scenario of identical material, specifically 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 football game activities using inquiry model syntax, including 1) The orientation stage: the students are introduced to the football material, such as basic techniques for passing, dribbling, shooting, heading, and game situations. 2) Problem formulation: students face technical or tactical problems in football. 3) Formulate a hypothesis. At this stage, students are trained to provide temporary answers to questions regarding the material being studied. Students explain the strategies for managing the problems. 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 managing the problems to ensure students obtain authentic data and information based on findings in the field. 5) Testing hypotheses: At this stage, students are trained 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 are delivered, such as how to free ourselves and our 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 obtained based on the results of hypothesis testing. At this stage, students provide conclusions about the problems. 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 praying.

The implementation of conventional model learning scenarios was given to 35 PJKR 4 A students as the control group. The preliminary stage is identical to the experimental group; the lecturer carries out a percentage, conveys learning objectives, and warms up in a football game. In implementing the core learning, the conventional model has its syntax, such as 1) study football history. 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 football game, and 8) study football tactics. The closing activity is identical to the inquiry model group, reflecting on the learning series from beginning to end, cooling

down, and ending with prayer. The number of meetings between the experimental and control groups was the same, namely eight meetings.

The experimental group and control group held 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 football game. 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, and 5) Evaluation ability. The final process is accomplished by calculating 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

After the data is presented, the next step 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.

**Table 2.** Critical Thinking Ability Category Criteria

Score Intervals	Classification
80% < T ≤ 100%	Extremely Good
60% < T ≤ 80%	Good
40% < T ≤ 60%	Medium
20% < T ≤ 40%	Poor
0% ≤ T ≤ 20%	Extremely Poor

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 the two groups from applying the inquiry and conventional models.

## 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 Table 2.

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

	Control	Striking	Shooting
ling			
Analysis	80	79	80
Synthesis	82	80	78
Problem-Solving	82	81	81
Conclude	83	82	79
Conclude	83	80	80
Average	80	80	80
Category	Extremely Good	Extremely Good	Extremely Good

Based on Table 2, 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, critical-thinking students' ability to control the ball is extremely good. 2) striking skills got a score of 79, synthesis 80, problem-solving 81, concluding 82, and evaluation got a score of 80, so the average score of creating space in an attack is 80. From the average score, the student's critical thinking ability for striking is extremely good. 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 critical thinking ability in shooting the ball into the goal is extremely good.

The results of students' critical thinking abilities in the conventional model group in playing football were measured identically to the inquiry model group. It consists of controlling, striking, 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 Table 3:

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

	Control	Striking	Shooting
ling			
Analysis	77	75	73
Synthesis	75	70	71
Problem-Solving	72	71	72
Conclude	70	73	70
Evaluate	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) controlling 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, students' critical thinking ability to maintain control of the ball is in a good category. 2) striking is 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 an attack is 73. From the average score, students' critical thinking ability in striking skill is in a 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, students' critical thinking ability in shooting the ball into the goal is in a good category.

## DISCUSSION

Based on research findings from applying the inquiry model to students' critical thinking skills in learning football. It is stated that goal-scoring tactics include several indicators, including controlling the ball, striking, and shooting. 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 rival's goal and preventing the rival from putting the ball into our team's goal (Sucipto et al., 2000). In the modern football era, controlling the ball has become its 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 sufficiently understand how to defend the ball as well as possible—implementing 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 et al., 2019). Through inquiry learning, students learn to comprehend the game of football, formulate problems, and formulate temporary answers to the problems posed (how to score goals). The step is to collect data and information by repeating movements and implementing appropriate basic techniques. The skills for maintaining control of the ball, testing hypotheses and drawing conclusions is the entire learning series (McCullagh & Doherty, 2021).

The next indicator for scoring goals is how the team can create space in attack/striking (Tarigan, 2001). Students learn to contextually create space by applying appropriate technical factors such as effective dribbling, support, and overlap. Through the inquiry learning model, students systematically use scientific steps based on investigation. Students learn to analyze problems and integrate relevant basic football techniques according to their needs during the game. Football games require complex skills to solve tactical problems. The ability to solve problems in the field sharpens students' critical thinking. The challenge is created when the rivals closely guard all arenas, and students must make the right decisions quickly. Implementing the inquiry model can sharpen decision-making skills (Lin, 2016).

Learning the material on shooting the ball into the goal using an inquiry model, students think about 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 rival's goalkeeper's area is tightly guarded, releasing shots at the goal with the right timing and decision-making. It is accurate when the ball should be shot or given to a partner in a more advantageous position to shoot it into the goal (Setia & Darmawan, 2018). In the series of learning football material from start to finish, students have learning experiences 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 extremely good.

The results of students' critical thinking abilities in learning football using conventional models were also analyzed. The findings differ from those of students who use the inquiry model. In the conventional model, students are presented with a repetition of basic techniques such as passing, dribbling, and repetition of basic shooting, as well as a basic heading with various variations and combinations. They also learned how to evaluate the implementation of several basic techniques. The results of critical thinking skills from applying the conventional model are insignificant because the conventional model substantially prioritizes improving psychomotor aspects (Metzler, 2000). Observations driven on students using the conventional model were seen based on their critical thinking abilities being in a good category.

## CONCLUSION

Applying the inquiry model for students as physical education teachers candidates to improve critical thinking skills in football game material has a significant impact. Students can analyze situations on the field, combine understanding (synthesis) of several basic technical elements according to game situations, solve technical and tactical problems, and make decisions and conclusions based on findings in the field. They can evaluate the entire learning series, especially in maintaining controlling, striking, and shooting the ball into the goal in football games.

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