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

Oman Hadiana*, Muzakkir Syamaun², Arhamni Binti Hamid³, Ratnawati⁴

¹Departement of Physical Education, Health and Recreation, STKIP Muhammadiyah Kuningan, Indonesia
²Faculty of Education, Mathematics and Science Education, Universiti Malaya, Malaysia
³Faculty of Human Development, Universiti Pendidikan Sultan Idris (UPSI), Malaysia
⁴Departement of Sundanis Language Literature of Education, STKIP Muhammadiyah Kuningan, Indonesia

email: hadianaoman@upmk.ac.id¹, S2109193@siswa.um.edu.my², P20211002759@siswa.edu.my³, ratnawati@upmk.ac.id⁴

doi: https://doi.org/10.20884/1.paju.2023.5.1.9764

Abstract

Physical education is about more than just 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. This research aims to implement an inquiry learning model on students' critical thinking skills in football in 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: the experimental group of 35 was given inquiry model treatment, and the control group of 35 was given conventional model treatment. The instrument for measuring critical thinking skills uses an observation sheet whose level of validity has been tested. The research results 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 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. Applying the inquiry model for students as prospective physical education teachers to improve critical thinking skills in football game material has a significant impact.

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

The inquiry-based teaching and learning process has existed before. It is not new in the scope of education, as stated by John Dewey, who provided enlightenment so that student learning outcomes are meaningful through action. Inquiry allows students to explore various subjects educators present because this model is student-centered. The current inquiry-based teaching model in physical education is a breakthrough in efforts to increase interesting and effective learning (Lynott & Bittner, 2019). Using the inquiry model in physical education teaching allows critical thinking and motor skills to work well (Simonton et al., 2021). Inquiry-learning model experts provide varied views regarding the syntax and nomenclature in each stage (Goodyear et al., 2013). Inquiry-based learning for students presents active learning, so several opinions agree that this teaching model is effective. Experts also argue that the inquiry-based learning stages are analogous to the scientific method and have the same 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 stage 1 is 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 on football game material, for example, the teacher can ask the following question: "How do you attack effectively so you can score a goal against your opponent's goal?". 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. Examples of some questions determined by teachers in learning football are as follows:

- How do we control the ball without being easily snatched by opposing players?
- What is an effective way to defend when an opposing player controls the ball?
- What is an effective way to open up the opponent's defense so the ball can enter the goalkeeper's net?

In the first stage of this inquiry model (clarification of the problem), the physical education teacher must provide some direction. Teachers can prepare general topics for students to make it easier for them to develop appropriate investigations. For example,
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: Defensive tactics and strategies play an important role in the game of football. In this material, students will identify effective defensive tactics and strategies to develop in the form of questions, and then students will discuss them with other colleagues. Even though the teacher sets problem limits on the investigated material regarding defensive strategies and tactics, students can identify the specific aspects they want to investigate. For example, students identify the following question: What makes the team's defense strong after two defenders enter the game? 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).

Stage 2 in learning using the inquiry model is formulating a hypothesis. In this stage, students try to answer the questions from stage 1 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 answers to questions asked in class. In stage 2, the teacher must express the hypothesis using if-then questions. We provide the following examples of several hypotheses and predictions:

- If you and your team are skilled in carrying out basic passing, control, and dribbling techniques, then your team will be able to master the game.
- If you and your team are skilled at making tackles, blocking tackles, interceptions, and correct timing, then your team can maintain a good defense against opponent attacks.
- If you and your team are 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 time when students can "compare and discuss suggestions, and together they can form a joint hypothesis or prediction." Students are encouraged to use prior knowledge and experience to help formulate their hypotheses. In the first example, students are asked to reflect on material about team ball control and observe what basic technical aspects play a role in that game situation. The physical education teacher shows students video feedback from a soccer game when the team has control of the ball. Ideally, teachers can guide their
students to formulate appropriate hypotheses. If a football team has all its players with good 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 try to synthesize all the data collected through the learning process, either through trials or research, through direct observation, and make conclusions from 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 unique 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). One teaching technique that has been identified as an effective way to engage and grow students' cognitive competence in physical education is inquiry-based learning (Ostergaard, 2016; Lynott & Bittner, 2019). Inquiry-based learning has a unique place in the physical education environment.

Prospective physical education teacher students need to be equipped with many competencies 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, and physical education learning evaluation. Applying teaching materials will be more systematic when using one of the learning models in the classroom. Of course, the model has its 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 research results on using this inquiry could be much better.
Suppose you look at the essence of the football game, not only being proficient in technical skills and strategic maturity. In that case, the ability to think critically, make decisions accurately, analyze the game, and combine the right technical factors (synthesis) during the game is important for a player to have this ability. For example, A player or team needs to be supported by several indicators, such as maintaining control of the ball, creating opportunities to attack, and shooting the ball into the opponent's goal to achieve a goal in football games. 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 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 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 impact students' mindsets to prepare prospective 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>
<thead>
<tr>
<th>Table 1. Research Design</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment Group</strong></td>
</tr>
<tr>
<td><strong>Control Group</strong></td>
</tr>
</tbody>
</table>
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 we have also received recommendations from authorized campus leaders.

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). At the same time, 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.

Two groups in the research, the experimental (inquiry model) and the 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 face a technical or tactical problem in football. For example, how do you score a goal against your opponent's goal while the player's guard is very tight in the goalkeeper area? 3) Formulate a hypothesis. At this stage, students are trained to provide temporary answers to questions regarding the material being studied. Students explain how to escape from the tight pressure in the goalkeeper's area to 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 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 shown, 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 several ways to score goals 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; the lecturer carries out a percentage, conveys learning objectives, and warms up, which is typical of 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 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 and control groups 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, 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>
<thead>
<tr>
<th>Score Intervals</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>80% &lt; T ≤ 100%</td>
<td>Very Good</td>
</tr>
<tr>
<td>60% &lt; T ≤ 80%</td>
<td>Good</td>
</tr>
<tr>
<td>40% &lt; T ≤ 60%</td>
<td>Enough</td>
</tr>
<tr>
<td>20% &lt; T ≤ 40%</td>
<td>Not Enough</td>
</tr>
<tr>
<td>0% ≤ T ≤ 20%</td>
<td>Very Less</td>
</tr>
</tbody>
</table>

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 the following table:

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

<table>
<thead>
<tr>
<th>Analysis</th>
<th>Maintaining Control of the Ball</th>
<th>Creating Space in Attack</th>
<th>Shooting the Ball into the Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintaining Control</td>
<td>80</td>
<td>79</td>
<td>80</td>
</tr>
<tr>
<td>Creating Space in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attack</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shooting the Ball</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>into the Goal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synthesis</td>
<td>82</td>
<td>80</td>
<td>78</td>
</tr>
<tr>
<td>Problem-Solving</td>
<td>82</td>
<td>81</td>
<td>81</td>
</tr>
</tbody>
</table>

https://doi.org/10.20884/1.paju.2023.5.1.9764
E-ISSN: 2686-5807 | P-ISSN: 2686-5793
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 of critical-thinking students to maintain control of the ball is in the very good category. 2) creating space in an attack is 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 an attack is 80. From the average score, the Students' critical thinking ability creates space to attack and is very 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 ability to think critically about shooting the ball into the goal is very good.

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

<table>
<thead>
<tr>
<th></th>
<th>Maintaining Control of the Ball</th>
<th>Creating Space in Attack</th>
<th>Shooting the Ball into the Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis</td>
<td>77</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>Synthesis</td>
<td>75</td>
<td>70</td>
<td>71</td>
</tr>
<tr>
<td>Problem-Solving</td>
<td>72</td>
<td>71</td>
<td>72</td>
</tr>
</tbody>
</table>
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, students’ critical thinking ability to maintain control of the ball is in a good category. 2) creating space in an attack 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, 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, students’ critical thinking ability in shooting the ball into the goal is good.

**DISCUSSION**

Based on research findings from applying 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. 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 et al., 2000). In the modern football era, possession of 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 better 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 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 to contextually create space by applying appropriate technical factors such as effective dribbling, support, and overlap. Through the inquiry learning model, students must 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, and students can integrate relevant basic football techniques according to their needs during the game. The game of football is so complex that 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, and students must make the right decisions quickly. 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, 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 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. 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
very good.

The results of students' critical thinking abilities in learning football using conventional models were also analyzed. The field findings differ from those of 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 are insignificant because the conventional model substantially prioritizes improving psychomotor aspects (Metzler, 2000). Observations made 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 prospective physical education teachers 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 control of the ball, creating space in attack, and shooting the ball into the goal in football games.

REFERENCE


