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Students' Critical Thinking Skills on Motion System Material in Elementary School

Febrialita Salma Dwinandha Putri*, Sandey Tantra Paramitha, and Leni Anggraeni

Universitas Pendidikan Indonesia

ORCID
Febrialita Salma Dwinandha Putri: https://orcid.org/0009-0001-2226-2496

Abstract.
Scientific thinking skills are a key to learning science. The current research aims to analyze: (1) if the design of the Learning Implementation Plan (RPP) contains indicators of students' critical thinking skills and (2) class IV learning activities leading to critical thinking skills. The research is qualitative. The research samples used were fifth-grade teachers and students of classes IVA and IVB. The research object used is the RPP and the science learning activities. Data collection techniques were interviews, observation, and documentation. The instruments used in the study were interview sheets and observation sheets validated through content and construct validity tests. The results showed that: (1) the design of the RPP leads to indicators of critical thinking skills and (2) it can be implemented through the learning process.

Keywords: movement system, learning, elementary school

Corresponding Author: Febrialita Salma Dwinandha Putri; email: blorasalma394@gmail.com

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1. INTRODUCTION

Natural Science (IPA) is a scientific discipline that aims to educate and understand about nature and its conditions. Science teaches about the surrounding environment as a direct learning object [1]. Science is learning that understands and explains the basic principles that govern the universe to develop knowledge that can be applied in various contexts [2]. Science subjects are a vehicle for students to study themselves and the surrounding nature, as well as prospects for further development in applying them in everyday life [3] Concepts in science are obtained through a series of scientific processes that empower thinking skills.

The linkage of critical thinking in science learning requires student preparation in order to become a problem solver. Thinking skills are skills in combining knowledge, attitudes, and skills that allow students to be able to shape the environment to be more effective [4]. Critical thinking is an intellectually disciplined process that actively

and skillfully conceptualizes, applies, analyzes, synthesizes, and evaluates information gathered from observation, experience, reflection, reasoning and communication as a guide to beliefs and actions [5]. Critical thinking is self-regulation in deciding something that results in interpretation, analysis, evaluation, and inference, as well as exposure using evidence, concepts, methodologies, criteria, or contextual considerations that are the basis for making decisions [6]. Based on some of these opinions, it can be concluded that critical thinking is an active way of thinking to gain knowledge and achieve certain goals.

There are several characteristics of critical thinking according to Facione (1990), namely: 1) Interpretation, 2) Analysis, 3) Evaluation, 4) Inference, 5) Explanation, 6) Self-regulation. Students are said to be able to think critically when students can analyze information using logic and process the information to get the truth [7]. Students' critical thinking skills can be developed by using the application of learning models that can stimulate students to think and understand more about the material that has been given by the teacher [8]. Sharpening critical thinking skills can also be done by presenting cases in learning so that students are encouraged to use their critical thinking skills when analyzing and solving the available cases [9].

Survey data conducted by The Trends in International Mathematics and Science Study in 2011 showed that more than 95% of Indonesian students were only able to answer intermediate level questions, while around 50% of students in Taiwan were able to answer higher level questions [10]. The factor is the ability of Indonesian students who are less trained in solving questions that are contextual in nature, demanding reasoning, argumentation and creativity in solving them. Based on observations and interviews in elementary schools, students have difficulty answering questions that require critical explanations and teachers do not know the level of students' critical thinking skills in the learning that is done. Based on these problems, the research "Analysis of Students' Critical Thinking Ability on the Motion System Material in Elementary School" was conducted.

2. METHOD

This type of research is qualitative research. Qualitative research focuses on in-depth observations that can produce a more comprehensive study of a phenomenon [11]. The samples used in the study were class IV teachers, students of class IVA and IVB. The research object used in the research is the Learning Implementation Plan (RPP) and science learning activities. Data collection techniques through interviews,

observation and documentation. The instruments used in the research are interview sheets and observation sheets. The data obtained will be analyzed descriptively through the process of data collection, data reduction, data presentation and conclusion drawing [12].

3. RESULTS AND DISCUSSIONS

The Learning Implementation Plan (RPP) document made by the fourth grade science teacher is used to determine the achievement of critical thinking skills in elementary school students, the document to be analyzed is the material of the human motion system with an allocation of time for 2 meetings. This analysis activity is carried out by looking at learning indicators and objectives, learning model used and students' cognitive learning outcomes. Learning achievement indicators are made by teachers as a marker in achieving basic competencies which are marked by changes in behavior measured in attitudes, knowledge and skills [13]. Meanwhile, learning objectives are derived from the learning achievement indicators made by the teacher. Learning objectives contain mastery of operational competencies targeted in the lesson plan [14]. Indicators and learning objectives have led to students' critical thinking skills. These results can be summarized in Table 1.

TABLE 1: Achievement of critical thinking skills aspects on science learning indicators and objectives.

Critical Thinking Skills Aspects	Operational Description	percentage (%)
Explain	Explain and express the functions of the skeleton and movement system	50,5
Analize	Comparing, analyzing, and relating learning to daily life	40,5
Evaluate	Classify bone shapes	9

The explanation aspect (50.5%) can train students to explain and express which contains the cognitive domain in it. In the explanation aspect, there are indicators and learning objectives that contain the cognitive domain of explaining and expressing [15]. The analysis aspect (40.5%) is utilized by students in strengthening their thoughts or coming up with an idea from the learning activities that have been carried out. Analysis is that students can identify relationships between statements, questions, concepts given in the problem shown so that they can provide the right explanation. It is expected that students are able to understand to describe or categorize so that they can provide the right explanation [16]. Evaluation aspect (9%) Evaluation is using the right way or steps

in solving problems, so that it can solve problems and also provide the right solution. It is expected that students are able to solve or solve a problem critically logically [17]. The evaluation aspect is an indicator that invites students to examine statements or representations that assess or describe perceptions, experiences, situations and judgments. In this aspect there are indicators and learning objectives that contain the cognitive domain of classifying [18].

The analysis of the lesson plans shows that the teacher has used the Problem Based Learning (PBL) learning model to invite students to solve problems. In Problem Based Learning (PBL), students are given a real problem or complex situation, and they then work together to find a solution or answer to the problem [19]. The Problem-Based Learning learning model includes the ability to improve concept understanding, improve problem-solving skills, and stimulate learning motivation [20]. The analysis related to learning steps was carried out by conducting observations covering the introduction, core activities and closing activities contained in Table 2.

Table 2: Achievement of critical thinking skills aspects on science learning indicators and objectives.

Stage,	Type of Activity	Percentage of Critical Thinking Activities (%)
Introduction activities	Providing questions about the material (interpretation and analysis)	30
Core activities	The teacher asks students to observe materials or tools related to the material (analyze). Students analyze and discuss the problems given by the teacher (analysis). Students present the results of the discussion (evaluation and explanation).	50
Closing activities	The teacher and students summarize the material that has been presented (inference).	20

Table 2 explains that the preliminary activities have carried out 30% of students' critical thinking activities. This can be seen when the teacher asks questions about the material to be presented. In the core activities there are 50% critical thinking activities in students because the teacher asks students to analyze and discuss in groups and present the results of their discussions. In the core activities, students can also practice how the human movement system works directly so that students relate learning to everyday life because the human movement system is closely related to the physical movements carried out daily [21]. Whereas in the closing activity the teacher and students together conclude the results of the learning that has been carried out.

The worksheet given to students has several components, namely material, practicum, assignments and questions. The student worksheet directs students to describe the structure and function of the skeleton, identify the function of joints, identify the structure and function of muscles. Achievement of students' critical thinking aspects. The aspects achieved in student worksheets are aspects of interpretation, analysis, explanation, evaluation, inference, explanation and self-regulation (Figure 1).

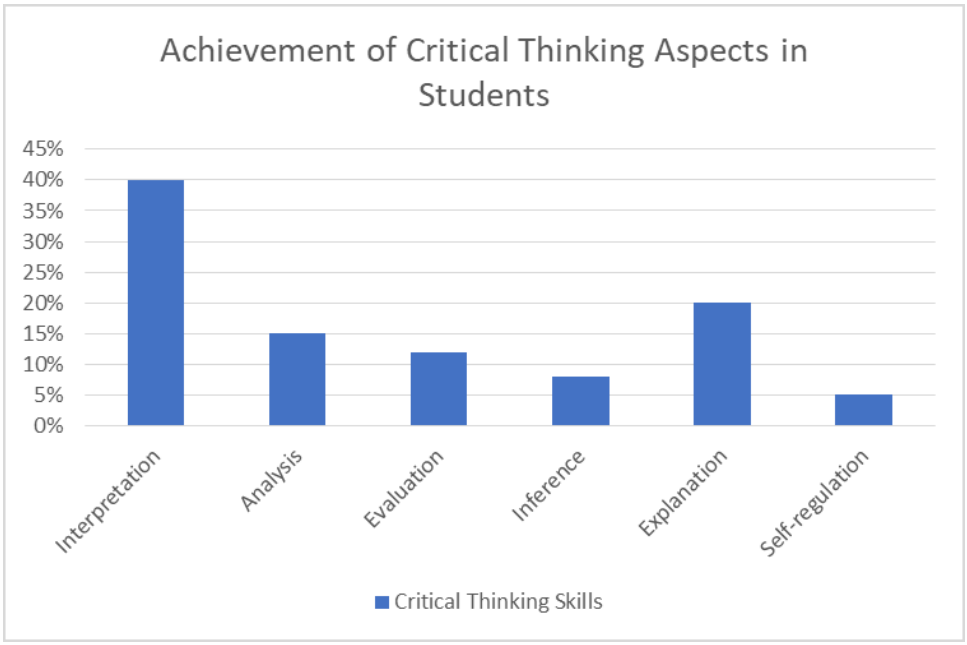

Figure 1: Achievement of critical thinking skills aspects in Students.

Student worksheets regarding practicum contain aspects of critical thinking skills, namely analysis, explaining, concluding. In the worksheet, students are required to be able to identify the types of joints and provide real examples of how hinge, swivel, bullet and sliding joints work. The questions in the worksheet require students to be able to think critically and find solutions to the problems faced. The data above shows that the teacher has conducted learning in accordance with the lesson plan which contains aspects of critical thinking skills in students. In the core activities, most of the learning activities are carried out by students because students are given time to group and solve the problems provided. Students are given time to discuss with each other to solve their own problems. Discussion activities are activities that can develop various abilities of children, namely improving communication skills, developing cooperation skills, improving critical thinking skills, developing understanding of various perspectives, increasing student activeness, and developing social and emotional skills [22]. In the closing activity, it has been carried out by the teacher as a whole in accordance with the lesson plan.

4. CONCLUSION

Based on the description in the study, it can be concluded as follows: (1) The lesson plan design used in learning activities has contained aspects of critical thinking skills shown in the indicators and learning objectives that contain aspects of explanation (50.5%), analysis (40.5%) and evaluation (9%). Learning activities carried out using a problem-based learning model that leads to students' critical thinking skills because students are required to solve their own problems. Student worksheets used in learning, assignments, practicums and questions given contain aspects of critical thinking skills. (2) Learning activities carried out by teachers are in accordance with the lesson plan and contain cognitive thinking skills, namely introduction activities (30%), core activities (50%) and closing activities (20%).

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