

# Implementation of Guided Inquiry to Increase Students' Interest in Learning Physics and Critical Thinking Skills

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**Abstract** - The guided inquiry learning model is a pedagogical approach that has demonstrated significant potential to enhance students' critical thinking abilities and their interest in learning. This study aims to examine the extent of improvement in students' critical thinking skills and learning interest through the application of practicum media integrated with the guided inquiry learning model. The research methodology employed in this study follows the Research and Development (R&D) framework, utilizing the 4D model (Define, Design, Develop, Disseminate) to systematically design and evaluate the instructional approach. The research was conducted over a period of two months at SMA Negeri 1 Sewon, involving 35 students from class X-9 as the sample. The students participated in guided inquiry-based learning activities that incorporated practicum media specifically designed for this study. To evaluate the outcomes, a descriptive statistical analysis was conducted using normalized gain scores to measure the improvement in students' critical thinking skills and interest in learning. The results of the study indicate a significant increase in both students' critical thinking abilities and their engagement with the learning material after the implementation of the guided inquiry learning model with practicum media. These findings suggest that the guided inquiry model not only facilitates the development of critical cognitive skills but also enhances student motivation and involvement in the learning process. Given these results, it is evident that the guided inquiry learning model, when supplemented with practicum media, provides a promising instructional strategy for improving both cognitive and affective domains of learning. Further research is recommended to explore the applicability of this model in different educational contexts and across various disciplines to confirm the generalizability of these findings.

**Keywords:** Guided Inquiry; Practicum Media; Critical Thinking; Interest in Learning; Physics

## INTRODUCTION

The 21st century is characterized as a century that experiences changes in the development of science and technology. Education in the 21st century demands abilities that students must have. The skills in question are the 4Cs skills: Communication, Collaboration, Critical Thinking, dan Creativity (Sutarto, 2023). The cause of the low critical thinking skills of students in Indonesia is the weak learning process. When learning physics, students are often used to memorizing concepts so they are less able to understand the material in real life (Respatiningrum et al., 2017). To improve students' critical thinking skills to include daily life problems into the learning

process (Wulandari et al., 2020). So, students need to have critical thinking skills.

Critical thinking and interest in learning have a relationship in learning physics. Students who have a high interest in learning tend to be more active and have critical thinking skills. This is because students are encouraged to understand the material more deeply. In 21st-century physics learning, interest in learning is an important factor because physics is often considered a difficult and abstract subject. Lack of interest in learning will cause students to be reluctant to be actively involved in learning which will lead to low learning achievement. Increasing critical thinking skills and interest in learning in physics learning in the 21st century is an

urgency that cannot be ignored. Critical thinking helps students understand, analyze, and solve complex problems. Meanwhile, interest in learning will encourage students' active involvement during the physics learning process.

Learning media is one way to improve students' critical thinking skills (Busra et al., 2015). Good learning media will help students stimulate learning by providing responses, asking questions and conducting experiments (Isroqmi, 2015). Through practicum media, students will be trained during learning to improve critical thinking skills (Cesariyanti et al., 2022) and interest in learning (Wata et al., 2023) through problems in everyday life. Meanwhile, the syntax of the guided inquiry learning model consists of orientation, formulating problems based on existing knowledge, formulating hypotheses according to existing literature, collecting data based on experiments, testing hypotheses based on data, and formulating conclusions (Indawati et al., 2021). So that practical media can help students improve their critical thinking skills and interest in learning physics.

One practical approach to developing students' critical thinking skills and interest in learning is through guided inquiry. This learning model encourages students to actively participate in the learning process by asking questions, formulating hypotheses, conducting experiments and drawing conclusions (Medriati et al., 2021). Implementing the learning model shows positive results in improving students' critical thinking skills, so this research aims to determine the increase in students' critical thinking skills and interest in learning when using practicum media using the guided inquiry model.

## RESEARCH METHODS

This research uses the Research and Development (R&D) method with the 4D model (define, design, develop, disseminate). This study aims to determine the increase in students' critical thinking skills and interest in learning when using practicum media using the guided inquiry model. Stage define aims to define learning requirements by conducting initial observations on the learning tools used during the physics learning process. The stage defined includes steps: initial analysis, student analysis, task analysis, concept analysis, and analysis of initial learning objectives (Thiagarajan et al., 1974).

Initial analysis carried out observations and interviews with class X physics educators at SMA Negeri 1 Sewon. Student analysis was carried out on 35 students in class X-9 of Sewon State High School for the 2023/2024 academic year. Task analysis is carried out by adjusting the curriculum and learning objectives used with indicators of independent curriculum learning achievement. Concept analysis is carried out by adapting the material problems of the law of conservation of mechanical energy to everyday life. Finally, analysis of learning objectives is carried out by adjusting the learning objectives used to be linked to indicators of critical thinking abilities and interest in learning.

Level design aims to design a prototype of teaching materials in the form of practical media, at this stage it is still an initial product that will then be developed. The teaching material product is a practical medium for the law of conservation of mechanical energy using cardboard, hoses, and marbles. This product was created as a simulation of a roller coaster which helps students understand the concepts of potential energy, kinetic energy, and mechanical energy at a certain height point.

Level development aims to produce the final form of the practicum media product which is developed by the initial references produced from the stage design. The practicum media products that have been developed are then validated by experts and practitioners. After the product is said to be valid, the final stage is dissemination, which aims to disseminate products that have gone through a process of review, providing advice and validation so that the reach of research information becomes wider.

The subjects of this research were students in class X-9 of SMA Negeri 1 Sewon with a total of 35 students. Data on increasing critical thinking skills and interest in learning are obtained from work scores pretest and posttest. Critical thinking abilities are measured based on indicators that have been synthesized, namely analysis, evaluation, and conclusions (Ennis, 2011). Meanwhile, interest in learning is measured based on indicators that have been synthesized, namely interest, attention, and feelings of pleasure (John Dewey, 1933).

Learning instruments in the form of teaching modules and learning media were assessed for their suitability, analyzed using Ideal Standard Standards (SBi), and their validity was measured using Aiken's V. Meanwhile, data collection instruments such as critical thinking ability tests and learning interest was assessed for validity using Item Response Theory (IRT) and its reliability using the QUEST program as seen from the reliability of the estimate. The increase in students' critical thinking skills and interest in learning is analyzed using a formula normalized gain with the following equation:

$$n \text{ gain } (g) = \frac{\bar{X} \text{ final score} - \bar{X} \text{ initial score}}{\text{maximum score} - \bar{X} \text{ initial score}}$$

The analysis results using normalized gain are interpreted into categories as in Table 1.

**Table 1.** Normalized gain categories

N Gain ( <i>g</i> )	Category
$g \geq 0,7$	High
$0,7 > g > 0,3$	Medium
$g < 0,3$	Low

(Hake, 1999)

## RESULTS AND DISCUSSION

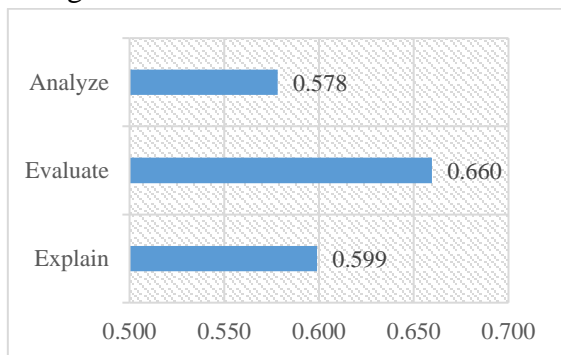
The product of this research is practicum media on the Law of Conservation of Mechanical Energy using used cardboard, hoses, and marbles. This practicum media is based on a guided inquiry learning model. Practical media refers to learning outcomes, critical thinking indicators, and interest in learning. The easy application of this practicum media can help in learning activities.

Through practicum media integrated with the guided inquiry learning model, it helps improve students' critical thinking skills and interest in learning. This is because students are invited to formulate problems based on their knowledge, formulate hypotheses according to the literature, collect data based on experiments, test hypotheses based on data, and formulate conclusions. This aligns with research conducted by (Kristiyani et al., 2020) and (Fitri et al., 2021) that through guided inquiry-based practicum media you can improve students' critical thinking skills and ask for learning.

The indicators used for critical thinking skills are analyzing, evaluating and explaining (Domenici et al., 2020). In the analyzing stage, students analyze the relationship between the concept of the Law of Conservation of Energy material and the use of practical media. Then, students summarize the required elements, draw conclusions, and explain the learning with

evidence. Meanwhile, students' learning interest indicators are interest, attention and feelings of joy (Wahyuningsih et al., 2021). Interest and attention can be observed during practicum activities, such as students' curiosity to understand the learning material and enthusiasm for learning.

The results of data obtained from test instruments, in the form of questions and questionnaires given before and after the use of practicum media, show an increase in students' critical thinking skills and interest in learning. Descriptive analysis was carried out using equations normalized gain. The increase in critical thinking skills can be seen in Figure 1.



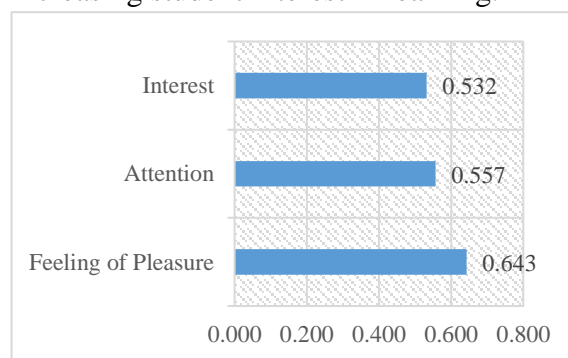
**Figure 1.** Enhancement of critical thinking skills

Based on Figure 1. The average increase in critical thinking skills for each indicator is known. These three indicators show that the increase in students' critical thinking skills is in the medium category. The evaluating indicators show that there has been the highest increase among the three critical thinking indicators. This is because the use of LKPD helps students formulate hypotheses according to the literature, collect experimental data based on guided inquiry learning syntax, namely testing hypotheses based on data, and also formulate conclusions to help students improve their evaluation skills (Sarifah & Nurita, 2023).

Meanwhile, the analyzing indicator shows that students have the lowest

improvement among the three critical thinking indicators. This is because some students tend to be more silent and inactive so the discussions carried out do not achieve results by analyzing indicators (Naziah et al., 2020). Overall, it shows that the use of practicum media based on the guided inquiry learning model can improve students' critical thinking abilities.

Based on the improvement data, critical thinking skills and the use of practical media can also increase students' interest in learning. Figure 2 is a diagram of increasing student interest in learning.



**Figure 2.** Enhancement of learning interest

Based on Figure 2, it is known that the average increase in student interest in learning for each indicator. These three indicators show that the increase in student interest in learning is in the medium category. The feeling of happiness indicator shows that it has the highest increase among the three indicators. This is because previously students rarely did practicums and only did monotonous learning, so that when teachers provided practicum activities, students felt there was innovation in learning (Yulianingsih & Gaol, 2019).

Meanwhile, the interest indicator shows that students have the lowest increase among the three indicators of interest in learning. This is because some students do not have the enthusiasm and desire to understand the material in depth so the learning carried out does not achieve results that match the interest indicators (Setiawan

et al., 2022). Overall, it shows that the use of practicum media based on the guided inquiry learning model can increase students' interest in learning. Overall, the average increase in students' critical thinking skills and interest in learning when using practicum media based on the guided inquiry learning model can be seen in Tables 2 and 3 as follows,

**Table 2.** Average increase in critical thinking skills

Test	Average	N gain	Category
Pretest	45,52	0,612	Medium
Posttest	78,86		

**Table 3.** Average increase in interest in learning

Test	Average	N gain	Category
Pretest	54,97	0,575	Medium
Posttest	73,97		

Tables 2 and 3 show that value normalized gain on increasing critical thinking skills and interest in learning is included in the medium category. Based on the results obtained, it can be concluded that the use of practicum media based on the guided inquiry learning model can improve students' critical thinking skills and interest in learning. In line with research conducted by Agustina et al. (2020) students who are treated with the guided inquiry learning model will be trained to express opinions, and question answers from existing information. Pramudya & Safrul (2022) concluded that by implementing the inquiry learning model, it can change from boring learning to fun learning thereby increasing students' interest in learning. The application of guided inquiry learning will provide students with the opportunity to suspect and prove these assumptions through experiments. Through discussion activities, communicating opinions, and solving problems, students can improve their critical

thinking skills. The guided inquiry model also creates easy and not boring learning in the classroom so that it can foster students' interest in learning.

## CONCLUSION

The use of practical media based on a guided inquiry learning model based on the results of calculations using equations normalized gain shows that there is an increase in students' critical thinking skills and interest in learning. Each indicator of critical thinking and interest in learning has increased in the moderate category. Suggestions for further research include research that discusses the 'formulating and considering alternatives' aspect of critical thinking skills as well as the 'responsibility for learning' aspect. The guided inquiry learning model will be even better if implemented with experimental activities assisted by learning media. However, careful planning is needed so that the goal of improving critical thinking skills and interest in learning is achieved.

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