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META-ANALYSIS OF THE EFFECT OF INQUIRY TRAINING LEARNING MODEL ON THE LEARNING OUTCOMES OF HIGH SCHOOL PHYSICS STUDENTS CLASS X

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ABSTRACT
Learning physics is considered difficult and unpleasant by most students. This is because at the time of learning the teacher did not apply a learning model that involved students, resulting in low student learning outcomes. This study aims to reanalyze the influence of the inquiry training learning model on the learning outcomes of high school physics students in class X. This type of research is a quantitative metaanalysis. The sample consists of 10 articles with S1-S6 reputation. The collection of articles uses an instrument, namely an observation sheet. The results obtained that the average effect size of the influence of inquiry training learning model on physics learning outcomes in high school class X is 0.885 in the medium category and the inquiry training learning model is effectively used on heat material with an effect size of 1.162 in the high category. Based on the results of this study, it was found that there was an influence of the inquiry training learning model on the learning outcomes of high school physics students in class X.
Keywords: Inquiry Training; Learning Outcomed

INTRODUCTION

Education is an indispensable process for developing human resources. The education process is part of an inseparable development process to develop human resources. Education can develop human resources so that they have high competitiveness (Purba & Sirait, 2015). Human quality in terms of education can be seen in the Law of the Republic of Indonesia No. 20 of 2003 article 1 concerning the national education system which states that national education aims to develop potential and personality as well as skills needed in society, nation and state (Arisa & Simamora, 2014).

To achieve the goals of national education, it is necessary to improve learning at school, especially in physics lessons. Physics is one of the branches of science. Physics is a very important and interesting subject to learn (Sagita & Sani, 2019). Physics studies natural science or symptoms and phenomena in the universe by involving scientific processes and scientific attitudes (Sinaga & Manter, 2014). Physics lessons emphasize to improve competencies so that students are able to think critically and systematically in understanding physics concepts, so that students gain a true understanding of physics (Harahap & Turnip, 2016). Physics learning is considered difficult and unpleasant by most students. This is because during learning the teacher does not apply a varied learning model and only provides notes and formulas, the absence of laboratory activities, teacher-centered learning, lack of student participation in learning activities so that students get bored and dislike the lesson. This resulted in low

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student learning outcomes (Sagita & Sani, 2019).

Considering physics as an important subject to develop students' potential, it is expected that learning activities can be fun and involve students so that students can develop their potential and student learning outcomes increase. The inquiry training learning model is a model that brings students into the scientific process directly through exercises that can condense the scientific process into a short period of time (Joyce & Weil, 2009).

The inquiry training learning model is a learning model that trains students to learn from facts to theory. This learning model starts from a belief about student freedom in the context of *independent* student development (Puspiandini, 2015: 2). Thus, in the inquiry training learning model, students are given freedom in development so that students are independent and learning styles to understand a theory that starts from facts can be trained in this *inquiry training* learning model. The purpose of this *inquiry training learning* model is to teach students to understand the process of researching and explaining an event (Wena, 2011: 76). The purpose of this model can help students develop the intellectual discipline and skills needed to ask questions and find answers based on their curiosity (Joyce & Weil, 2009). Thus, the process of researching that students understand and explain about an event is a goal of this *inquiry training* learning model.

Learning inquiry training starts from the curiosity of students, teachers can present events that are puzzles so as to raise students' curiosity about something (Arisa & Simamora, 2014). With the inquiry training model, learning is no longer centered on the teacher and students are required to be active in learning which is indicated by the courage of students to ask questions and express ideas (Juliani & Ginting, 2014). There are five stages in the inquiry training learning model. First, the teacher is required to present a situation or event that raises students' curiosity. Second, with the event given by the teacher, students collect information. Third, students begin to separate variables that are relevant to the problem and can hypothesize. Fourth, students are asked by the teacher to process the information or data they find and formulate an explanation. Fifth, students are asked by the teacher to analyze their research patterns (Sinaga & Manter, 2014).

The purpose of this research is to (1) re-analyze the effect of the Inquiry Training learning model on the learning outcomes of class X physics students on various materials and (2) see in what material the inquiry training learning model is more effectively used.

METHODS

This research uses a method, namely meta-analysis which is quantitative in nature. The meta-analysis research method combines previous research results using numbers and statistics to obtain and extract information from various similar research article data. The data collection technique was carried out by observing related articles on Sinta Ristekdikti. The analysis of the articles collected was carried out by paying attention to 1) the articles were in the S1-S6 reputation range; 2) the articles were published in 2011-2021; 3) the articles contained the t_{count} value or the average value of the protests and pretests of the control and experimental classes so that the effect size could be determined. Article collection uses an instrument,

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namely an observation sheet. Each article was coded then the article was analyzed to determine the effect size. The research sample consisted of 10 national articles with S5 reputation. Calculating the effect size value is a data analysis technique carried out (Oktrisma & Rahmayani, 2020). Calculating the effect size value can use the equation;

$$\text{Effect Size} = t_{hitung}\sqrt{\frac{1}{n_E}+\frac{1}{n_C}}$$

n_c in the equation is the number of control class students and n_E is the number of experimental class students.

Effect Size Value Interpretation **Table**

Effect Size Value	Category
0-0,20	Less
0,21-0,50	Low
0,50-1,00	Medium
>1,00	High

RESULT & DISCUSSION

This research is a meta-analysis using ten national articles. The ten articles discussed the effect of the inquiry training model on the learning outcomes of high school physics students.

The results of the meta-analysis of the ten articles can be seen in the following table:

Table 1. effect size value of the influence of the inquiry training learning model on the learning outcomes of high school physics students in class X.

No.	Article Code	Effect Size	Category	Average
1	A1	0,962	Medium	
2	A2	0,909	Medium	
3	A3	1,276	High	
4	A4	0,812	Medium	
5	A5	0,599	Medium	0.885
6	A6	1,054	High	(Medi
7	A7	0,447	Low	um)
8	A8	1,162	High	
9	A9	0,449	Low	
10	A10	1,176	High	

In table 2, the effect size of the effect of the inquiry training learning model on student learning outcomes is 0.885 medium.

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The next analysis is the effect of inquiry training learning outcomes on student learning outcomes on various high school physics materials. The results of meta-analysis on various materials can be seen in the table:

Table 2 and 3. effect size of the effect of the inquiry training learning model on student learning outcomes in class x material

No.	Article Code	Material	Effect Size	Category
1	A1	Static Fluid	0,962	Medium
2	A2	Dynamic Electricity	0,909	Medium
3	A3	Dynamic Electricity	1,276	High
4	A4	Dynamic Electricity	0,812	Medium
5	A5	Momentum and Impulse	0,599	Medium
6	A6	Temperature and Heat	1,054	High
7	A7	Dynamic Electricity	0,447	Low
8	A8	Caloric	1,162	High
9	A9	Magnitudes and Units	0,449	Low
10	A10	Momentum and Impulse	1,176	High

Material	Total Research	Effect Size	Category
Static Fluid	1	0,962	Medium
Dynamic electricity	4	0,861	Medium
Temperature and Heat	1	1,054	High
Caloric	1	1,162	High
Magnitudes and Units	1	0,449	Low
Momentum and Impulse	2	0,887	Medium

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In tables 2 and 3, the highest effect size was obtained in the heat material of 1.162 in the high category.

This study aims to re-analyze the effect of the Inquiry Training learning model on the learning outcomes of class X physics students on various materials and see in what material the inquiry training learning model is more effectively used.

Based on the first table, the effect size value varies from 0.4-1.2. The average effect size obtained is 0.885 with a moderate category. This means that the inquiry training learning model can improve student learning outcomes in the knowledge (cognitive) aspect. The inquiry training model provides opportunities for students to be actively involved in learning and develop students' intellectual abilities. The inquiry training model provides a confusing situation so that students want to investigate the problem and find out the answer to the problem.

Based on the second and third tables, we can see from ten source articles using six different types of physics material, namely, static fluid, dynamic electricity, temperature and heat, heat, quantities and units and momentum and impulse. Of the six different types of physics material, the highest effect size value is obtained in the heat material which is 1.162 with a high category. This means that in this material we effectively use the inquiry training learning model because it can improve student learning outcomes in this material. In heat material there are practicum activities that can encourage students to be actively involved in learning and with the inquiry training learning model the learning process can take place optimally and obtain the desired learning outcomes. This is supported by the research of Hasibuan et al (2015) that the inquiry training learning model gives an influence on student learning outcomes in heat material with a good average score.

CONCLUSION

Based on the research results and discussion of this meta-analysis research which aims to 1) Re-analyze the effect of the inquiry training learning model on student learning outcomes and 2) Looking at the material whether the inquiry training learning model is more effectively used, it can be concluded that: 1) There is an effect of inquiry training learning model on student learning outcomes in class X physics material with an effect size of 0.885 medium category, 2) The inquiry training learning model is effectively used in heat physics material with an effect size of 1.162 high category.

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