



The Effect of Guided Inquiry Learning Model on Students' Critical Thinking Ability on Elasticity Material

Aris Doyan ^{1,2*}, Risa Rahmawati ¹, Ahmad Busyairi ¹

¹Physics Education Study Program, FKIP, University of Mataram, Mataram, Lombok, West Nusa Tenggara, Indonesia.

²Master of Science Education Study Program, University of Mataram, Mataram, Lombok, West Nusa Tenggara, Indonesia

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Corresponding Author:

Author Name * : Risa Rahmawati

Email * : rhisarahma19@gmail.com

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Phone * : +62...

Abstract : The purpose of this research is to determine the effect of guided inquiry learning model on students' critical thinking skills. This type of research is a quasi-experimental using a control group and an experimental group. In this study, the population was used, namely all students in class XI MIPA SMAN 1 Jonggat Teachings in 2022-2023. Meanwhile, the samples for this study were class XI MIPA 4 and XI MIPA 5 which were determined based on the Purposive Sampling method. Instruments were used in the form of questionnaires, data analysis techniques were carried out with homogeneity, normality, and hypothesis testing. The results of this study showed that there was an influence of the guided inquiry learning model on the critical thinking skills of students' elasticity material with a sig value obtained of $0.00 < 0.05$ and obtained $t_{hitung} = 3.50$ and $t_{tabel} = 2.00$ meaning that there was a significant influence of the guided inquiry learning model on students' critical thinking skills.

Keywords: Learning Model, Guided Inquiry, critical thinking, elasticity

Citation

Introduction

As stated in Law No. 20 of 2003 concerning the National Education system Chapter I Article 1 it states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, control self, personality, intelligence, noble character, and the skills needed by himself, society, nation, and the State (Nasution *et al.*, 2018). The implementation of education is carried out in the form of learning activities. Because the progress of a country can be seen from the development of technology and the condition of its educators, it is necessary to strive to improve the quality of educators.

Learning that is quite important to learn is Physics. Jayanti & Bunga (2018) defines Physics as an interesting subject object and requires a strong basic understanding. Physics lessons focus more on the ability of students to analyze their knowledge with events or natural phenomena that they experience in everyday life. The study of physics requires students to be able to think logically, critically, creatively, and be able to argue correctly and physics lessons are not only a collection of facts, concepts or principles but also a process of discovery and prospects for further development in apply it in everyday life.

Physics learning is carried out with the aim of mastering concepts and principles and having the skills to develop knowledge and self-confidence as

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Example: Susilawati, S., Doyan, A., Mulyadi, L., & Hakim, S. (2019). Growth of tin oxide thin film by aluminum and fluorine doping using spin coating Sol-Gel techniques. *Journal of Science Education Research*, 1 (1), 1-4. <https://doi.org/10.29303/jppipa.v1i1.264>

provisions for continuing education at a higher level and developing science and technology (Kemendikbud, 2014). Based on these learning objectives, the implementation of physics subjects at the SMA/MA level must be a means to train students so they can master the knowledge, concepts and principles of physics. Therefore, learning Physics for high school students provides a challenge great for teachers

Critical thinking skills are one of the skills that must be possessed by students in the 21st century. Critical thinking skills have now become a trend that is the main focus of learning in several developed countries in the world. Several developed countries such as the United States, Canada, Europe, Australia, and New Zealand place critical thinking skills into their educational curriculum (Prayogi *et al.*, 2018). Likewise in Indonesia, since 2013 critical thinking skills have become one of the competencies that must be possessed by all students in Indonesia.

The results of data from PISA in 2018 quoted from *the Organization for Economic Co-operation and Development* (OECD, 2019) which aims to determine the quality of education and take policies towards the education of a country, where the education system in Indonesia in 2018 was ranked 72 out of 77 countries. Indonesia gets a science score of 379, while the other PISA average scores are 487. This proves that Indonesian students have the potential to think critically, logically, and solve problems which are in the low category. Critical thinking skills are considered as basic abilities that are very important to master. According to (Simbolon *et al.*, 2017), critical thinking is a process of finding, analyzing, synthesizing and conceptualizing information to develop one's thinking, increase creativity and take risks.

The low ability to think critically is caused by several factors, namely students tend to memorize material and formulas rather than understand concepts. This is in accordance with the initial investigation of research from (Sianturi *et al.*, 2018), explained that the lack of student response and the tendency to memorize rather than understand concepts causes students' critical thinking skills to be less trained. The active role of students is still lacking, indicated by the few students who are active in asking and arguing. This shows that students tend to focus on the teacher

without analyzing, criticizing, evaluating what is conveyed by the teacher

The success of the student learning process at school can be observed from the learning outcomes achieved. Aisyah, (2017) said that learning outcomes are a number of experiences gained and produce learning achievements from students as a whole and this occurs because of changes in behavior after participating in the teaching and learning process in accordance with educational goals. According to Kurniawan *et al.*, (2017) the factors that influence learning outcomes are internal factors and external factors. Internal factors are factors that come from within a person while external factors are factors that come from outside the individual. Both of these factors can be an obstacle or support for student learning.

Based on observations at SMAN 1 Jonggat, physics is often considered a subject that is difficult, boring, and has too many formulas. In addition, researchers received information that the physics learning process that has been going on so far is still dominated by conventional learning and is still centered on the teacher, not on students. In this learning, the teacher still uses lecture and discussion methods and still relies on textbooks and homework which are packaged in the form of worksheets. Based on the results of interviews with teachers, it was found that the students were less active during the learning process, so that the impact on the assessment of critical thinking skills and the learning outcomes of students through conventional learning was still low. This is proven by the number of students participating in remedial activities, which is around 50% with the KKM that has been set by the school for physics subjects is 75.

Responding to these problems, we need a learning model that is not student-oriented so that learning is more student-centered *and* students are more active during learning and can improve the assessment of critical thinking skills.

The learning model in question is the inquiry learning model. Damhuri, (2020) states that inquiry learning is a learning activity in which students are encouraged to learn through their own active involvement. Inquiry learning has several levels, namely controlled inquiry, guided inquiry, planned inquiry, and free inquiry. For students who are not used to doing learning by finding the physics concepts

they are learning for themselves, guidance from the teacher is needed so that students can find the concepts from the physics material they are learning. So in this case, the appropriate inquiry learning model is the guided inquiry learning model.

The guided inquiry learning model is a learning model that places students as learning subjects which means that each student is encouraged to be actively involved in learning activities (Amijaya, 2018). In seeking and carrying out investigations educators must develop students' thinking skills by facilitating students to become thinkers. In the guided inquiry model, students learn to hypothesize so that students are encouraged to think and work on their own initiative to find concepts directly (Anggraini, 2018). Through this, students can develop the ability to think critically to find solutions to any existing problems based on the knowledge that students get themselves. Learners will tend to be more active in learning, especially in expressing their thoughts. When students have the ability to think critically, it also has an impact on learning outcomes.

Several previous studies have shown a number of effects of using guided inquiry learning models in classroom learning. Yeritia et al., (2017) found that there was an influence of the guided inquiry learning model on concept mastery and critical thinking skills of class X students of SMAN 1 kuripan in the 2017/2018 academic year.

Research conducted by Muntari et al (2018), Ramandha et al (2018), Amijaya et al (2018), Harjilah et al (2019), Yuliana et al (2020), Amijaya et al (2019), Martatis (2023), Nisa et al (2018) , Solihin et al (2018), Wariyanti et al (2018), Jayanti and Amin (2018), Siagian (2019), Jaya et al (2018), and Nuriali et al (2018) found that inquiry learning has an influence on students' critical thinking abilities.

Through the application of the guided inquiry model, it is expected to improve critical thinking. Besides that, learning physics is no longer considered difficult by students and teachers can also provide explanations easily on material that is considered complicated and complex so that students become more active in participating in learning activities and teachers can develop creativity in varying learning models and methods. Therefore, this research was

conducted with the aim of seeing the impact of guided inquiry learning activities on critical thinking skills.

Method

The type of research used is quasi-experimental research. The research design used in this study is *the Nonequivalent Control Group Design*. The population in this study were all class XI MIPA students at SMAN 1 Jonggat Teachings in 2022-2023. The sampling technique in this study was *purposive sampling*. The sample used in this study was class XI MIPA 4 and XI MIPA 5. The research instrument was a questionnaire. In this study, trials were carried out on research instruments, namely validity, reliability and different tests.

Validity test was conducted to see whether the research data is valid. While the research reliability test aims to see whether the research data is reliable to be studied at a later time. Then a difficulty test is carried out to find out whether the questions to be tested are difficult to do. A different test was carried out to distinguish between high-ability students and low-ability students. Data collection techniques were carried out using homogeneity tests, normality tests, and hypothesis tests or t-tests. The homogeneity test is used to obtain the assumption that the research sample departs from the same or homogeneous conditions. The test criteria are as follows: If $F_{hitung} > F_{tabel}$, the data is not homogeneous while If $F_{hitung} \leq F_{tabel}$, the data is homogeneous. The normality test $X^2_{hitung} > X^2_{tabel}$ is to make a comparison between the data owned and the normally distributed data which has the same mean and standard deviation as the X^2 data owned $X^2_{hitung} \leq X^2_{tabel}$. then the data is normally distributed. The hypothesis test used is a two-party t-test at a significant level of 5 %, namely a hypothesis that does not show a certain direction with a working hypothesis using parametric statistics, namely *the polled variance t-test*. The formula for the two-party *t-test polled variance t-test* used is as follows (Sugiyono, 2019).

$$t_{hitung} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

Result and Discussion

The purpose of this research is to find out the effect of inquiry learning on the critical thinking skills of students at SMAN 1 Jonggat. The research instrument consisted of 5 critical thinking skills questions and 20 physics learning outcomes questions about elasticity. The instrument test was carried out in class XII MIPA 1 SMAN 1 Jonggat. The test instrument is used to determine the feasibility of the questions to be used in the *pretest* analyzed for validity, reliability, level of difficulty, and discriminatory power. The results of the analysis of the validity test of the critical thinking ability test instrument show that all questions are valid. The results of the analysis of the reliability test of the critical thinking ability test instrument show that all questions are reliable. The results of the test analysis of the difficulty level of the critical thinking ability test instrument showed that all questions were included in the easy category. The results of the analysis of the differentiating power test on the critical thinking ability test instrument showed that 1 item was included in the sufficient category, 1 item was included in the good category and 3 other questions were included in the very good category . after being given treatment. Result _ *pretest* and *posttest* can be seen in the following table,

Table 1. *Pretest* and *Posttest* Results for Critical Thinking Skills for the Experiment class

Ability	N	Highest Value _	Lowest Value _
<i>Pretest</i>	31	28	0
<i>Posttest</i>	31	92	72

Table 2 *Pretest* and *Posttest* Critical Thinking Ability Control Results

Ability	N	Highest Value _	Lowest Value _	Average
<i>Pretest</i>	31	28	8	12,6
<i>Posttest</i>	31	88	68	74.50

The table above shows the results of the *pretest* and *posttest* that the highest *pretest* score in the experimental class and the control class is 28. The lowest score in the experimental class is 0, while the lowest score in the control class is 8 . The average

pretest scores for the experimental class and the control class are still in the low category. Sedagakan *posttest value* the highest score of students in the experimental class was 92 while the highest score of students in the control class was 88. The lowest score of students in the experimental class was 72 while the lowest score of students in the control class was 68. The average value of the *Posttest* experimental class and control class were 78.80 and 74.50. So it shows that the results of the *posttest* in the experimental class and the control class have increased compared to the *pretest* scores in terms of the highest score, the lowest score, and the average value - r

The results of data processing of critical thinking skills for the experimental class and control class can be seen in Table 3 below.

Table 3. Critical Thinking Ability t Test Results

Class	\bar{X}	S	t count	t table	Information
Experiment	78,80	5,13	3.50	2.00	Haha accepted
Control	74.50	4.90			

Table 3 shows that there is a difference in the average *posttest* scores between the experimental class and the control class. Based on the results of the t test, it can be concluded that H_a is accepted because the value of $t_{count} > t_{table}$. This means that there is an influence of the guided inquiry learning model on students' critical thinking skills.

In the study the results were $sig < 0.05$ with a value of $0.00 < 0.05$ and obtained $t_{hitung} = 3.50$ and $t_{tabel} = 2.00$ meaning that there was a significant influence of the guided inquiry learning model on students' critical thinking skills. Thus it can be concluded that there is an influence of the guided inquiry learning model on the critical thinking skills of students' material elasticity. The results of this study support previous research by Yeritia et al., (2017) found that there was an influence of the guided inquiry learning model on students' mastery of concepts and critical thinking abilities. class X SMAN 1 kuripan academic year 2017/2018 . Thus it can be concluded that there is an influence of the guided inquiry learning model on the ability to think critically about the material elasticity of students.

Based on the results of data analysis, it can be seen that students' critical thinking skills in elasticity

material using the guided inquiry learning model produce higher critical thinking skills compared to using conventional learning models. This is in accordance with Widiatmo's theory, (2019) positing that guided inquiry is a learning model that can train students' skills in carrying out investigations to collect data in the form of facts and process these facts so that students are able to build conclusions independently to answer questions or problems raised by Teacher. Meanwhile, critical thinking skills are the ability to think using in-depth reasoning in obtaining relevant information or knowledge and being able to make correct and appropriate conclusions or decisions (Yuni, 2021).

The application of guided inquiry learning, students are given the opportunity to predict things that will happen in advance, prove the assumptions put forward through group experiment activities, solve problems by deciding on experimental results that are relevant to the problems posed and make conclusions . So that from these activities students are able to apply indicators of critical thinking skills, namely interpretation, analysis, evaluation, inference and explanation which causes students' critical thinking skills to increase. Meanwhile, using conventional learning models, the learning process places more emphasis on the process of delivering material verbally from the teacher to a group of students with the intention that students can master the learning material optimally. This is in accordance with Kristanto's theory (2017) which states that the guided inquiry learning model can improve students' critical thinking skills compared to conventional learning.

This research is in line with research findings from Ilhamdi et al (2020), Furmanti and Hasan (2019), Dewi et al (2020), Ellerton (2022), Agustin et al (2020), Annisa et al (2020), Indriyanti et al (2019) , Nurhayati et al (2020), Pertiwi et al (2018), Istakarini (2018), Yusuf and Gustivana (2022) who found results that guided inquiry learning had an effect on students' critical thinking abilities.

Conclusion

Based on results study And discussion, can concluded that there is an influence of the guided inquiry learning model on students' critical thinking skills. The suggestions that can be given based on the results of this study are the guided inquiry learning

model can be an alternative learning model that can be applied by teachers to train students' high-level thinking skills in teaching physics. In addition, in this study the indicators for critical thinking skills, namely indicators (providing further explanation) for both the experimental class and the control class, the improvement is still in the low category, so for future researchers who wish to use the guided inquiry learning model to improve students' critical thinking skills, so that the questions - questions on LKPD (Student Worksheets) to be further developed so as to facilitate these indicators.

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