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Article

## **Analysis of the Effect of Scientific Literacy and Questioning Ability on Science Learning Outcomes**

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### **ABSTRACT**

Achieving a learning purpose can be measured by learning participants. Learning results are the output of the learning process that learners produce from the learning activities that have been followed. These learning results relate to learners' ability and a supportive and far-reaching learning approach. So it is very important to know between components in the learning result. The scientific literacy approach and the ability to ask questions are key elements in improved learning. The study was intended to identify the impact between scientific literacy and the ability to inquire about the results of studying science at MTs Ngawi. The method of research used was the quantitative study method. The study population is MTS Ngawi with a study sample of 120 respondents from an IX class at MTS Al-Hidayah Kendal and MTsN 3 Ngawi. The study uses a question item test as an instrument for data collection that has been tested as a validity and religious one. The data obtained is analyzed with a quantitative description and statistics using linear mixed regression test analysis, anova, and coefficient determinations ( $R^2$ ). Based on the results of this study, it has been achieved that scientific literacy variables and the ability to ask affect simultaneously the results of studying science in 79% MTs with a regression of 62.824.

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## **INTRODUCTION**

Implementation of the learning process has many components in it that can support the achievement of the planned learning objectives. The purpose of this learning is none other than that students are able to understand the concept of the material given by the teacher. The level of understanding of this concept can be seen from the learning outcomes.

Learning outcomes are something that is obtained from a process of a process of human activity in life which includes the realm of knowledge, attitudes, and psychomotor. Furthermore, learning outcomes are defined as the abilities that students have after they receive their learning experiences. Meanwhile, according to Sardiman, learning outcomes are something that is obtained from changes in student behavior through teaching and learning activities after receiving the material that has been taught by the teacher, simply learning

outcomes are the output of teaching and learning activities (Neldawati, 2020). The success of this learning is not supported by other factors - skills and approach factors.

Natural Sciences (IPA) is part of science that is scientifically born and develops. Natural Science is a science that consists of knowledge itself and the process of being able to understand the concepts in that science. The direction of learning activities in the field of science is enabling students to be able to get information through the scientific activities they do so that it is not only centered on thinking skills about facts, laws, principles and theories. Rustaman argues that science process skills are required in science learning and have become an inseparable part of science learning.

One of the basic skills in science process skills is communication. These communication skills include the ability to ask questions. The definition of asking according to Harsanto is an attempt to propose or ask to explain information that is not yet known to people who are experts or understand the information/information. The ability to ask questions is the ability / expertise of students in submitting opinions and ideas to ask for clarity and truth to people who are more understanding or experts.

The ability to ask questions plays an important role in the process of understanding concepts, where students ask questions about what they don't know, they will get the information or knowledge contained in the answers asked (Wardana, 2016). The ability to ask questions is a basic skill that must be considered and developed. Moreover, science is one of the disciplines that the general public considers a difficult subject.

According to (Astuti, 2015) the ability to ask questions is included in scientific skills that are considered important to master. Questioning skills are a way of delivering learning material with two-way interaction, namely from teacher to student and from student to teacher in order to get the right information from the answers given by the teacher. All teaching and learning activities must apply question and answer or ask questions, such as during discussions, when finding difficulties in understanding the material, solving problems, observing, and so on (Nurwiratmi, 2020).

In fact, the teacher's attention to the ability to ask questions and students is still lacking. The ability to ask questions is still considered a skill that does not affect student learning outcomes. This is based on initial observations made which was supported by observations in the environment around the researcher's residence for junior high school students, researchers found various phenomena from students. This is supported by the results of Widodo's research which states that students who ask questions on average each student only 3 questions. Based on the research conducted, it can be seen that the ability to ask questions is still lacking (Agustini, n.d.).

According to research conducted by Sc Utami Munandar in (Oriza et al., 2015) it was found that students who asked a lot of questions were students who had high intellectual abilities. Asking questions will also train argumentation skills, because by asking students will convey their arguments. Students today are students who must be able to be more active in opinion and not only memorize subject matter. This ability also intends to form students' conceptual understanding of the material that has been taught by the teacher (Fadly, 2020).

Scientific literacy is an approach that has long been instilled in students. According to De Boer means understanding science and its application to the needs of society. Chiapetta and Udeani explain more specifically explaining scientific literacy into four themes or categories of science: science as a body of knowledge, science as a way of thinking, science as a way of investigating, interaction of science, technology, and society (Pamungkas et al., 2019).

The definition of scientific literacy is very diverse according to experts, such as Najah Nurhasanah mentions that scientific literacy is the ability of someone who has obtained and understood the concept of knowledge and then is able to use or utilize that knowledge to

analyze and solve problems in real life with solutions based on the concept of science (Nurhasanah, 2020).

Marta mentioned how the role of scientific literacy is actually able to create qualified human resources to answer the challenges of today's world. This will be achieved if students have *skills* in their fields and have attitudes that are in accordance with scientific competence (Nofiana, 2017). Scientific literacy is multi-literacy in which an individual must develop fluency in coordinating various scientific representations at appropriate times in the curriculum, and when viewed from a critical point of view, scientific literature also includes the ability to question and appropriate scientific knowledge in personally relevant circumstances (Ratini et al., 2018). Scientific literacy is expected to be able to support the success of the learning process. So there is a need for further studies to determine the effect of scientific literacy and the ability to ask questions on student learning outcomes because they are factors in learning outcomes.

## METHODS

This research is classified as an associative research type or a type of research to test the connectedness. According to Sugiyono, associative research is a research conducted to determine the relationship between two or more variables (Sugiyono, 2012). In this study examines the relationship between each independent variable on the dependent variable with a review of the learning environment. As well as testing the effect of the two independent variables simultaneously affecting the dependent variable. This study used a *cross-sectional* or cross-sectional design, which is a research design that collects data simultaneously and at the same time, where both dependent variables (learning outcomes), independent variables (asking ability, scientific literacy) are collected at the same time.

Sampling used is a sampling technique using *probability sampling*. Researchers in the *probability sampling technique* using *Simple Random sampling*. It is called simple (simple) because the sampling is done randomly. This method can be done if the members of the population are homogeneous members. Based on the sampling technique chosen by the researcher, the researcher determined a sample of 120 students of class IX. To review the learning environment, the researchers chose schools that were based on Islamic boarding schools and those that were not based on Islamic boarding schools.

The scientific literacy approach is assessed through an item test on the principles of scientific literacy which consists of 12. The ability to ask questions is measured using a standardized understanding test consisting of 20 multiple choice questions with four alternatives that give a graded score, which is at least 1 point and the highest is 4 points. Learning outcomes are obtained from students' year-end exam scores in science, accessed from student records and used as a measure of academic achievement.

## RESULTS AND DISCUSSION

Research data were taken using item tests to measure scientific literacy and ability to ask questions and documentation to get the value of students' learning outcomes in science subjects. The material chosen is material that has been studied in class VIII.

Based on the data obtained from all respondents, then the regression test, ANOVA, and the coefficient of determination ( $R^2$ ). The results of the regression test are as follows:

**Table 3.** Regression Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	62.824	4.988		12.595	.000
Literasi Sains	.067	.028	.212	2.414	.017
Kemampuan Bertanya	.212	.082	.227	2.583	.011

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
a. Dependent Variable: Hasil Belajar					

Results of the multiple linear regression equation that the constant value of 62.824 states that the learning outcomes of students at MTs Ngawi are 62.824, assuming scientific literacy variables (X1) and the ability to ask questions (X2) is ignored. The constant value of 62.824 indicates if scientific literacy and ability to ask questions = 0 or none, then the learning outcomes of students at MTs Ngawi are 62.824.

**Table 4.** ANOVA Test Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	345.786	2	172.893	6.078	.003 <sup>b</sup>
	Residual	3328.214	117	28.446		
	Total	2674.000	119			

a. Dependent Variable: Hasil Belajar

b. Predictors: (Constant), Kemampuan Bertanya, Literasi Sains

Based on Table 4 shows that the  $F_{\text{calculated}}$  is 6.078. The sample used is 120 respondents. The number of independent and dependent variables = 3, so that the value of  $df_1 = k - 1 = 3 - 1 = 2$  and  $df_2 = 120 - 2 = 118$ . In table  $F_{0.05, df(2)(118)}$  the value of  $F_{\text{table}} = 3.07$ .  $F_{\text{calculated}}$  (6.078) is greater than  $F_{\text{table}}$  (3.07) and the value of  $P$ -value = 0.003 is smaller than *the level of significant* ( $\alpha = 0.05$ ), it can be seen that  $H_0$  is rejected and  $H_a$  is accepted. This means that there is a simultaneous influence of scientific literacy and the ability to ask questions on student learning outcomes at MTs Ngawi.

**Table 5.** Determination Coefficient Test Results ( $R^2_{\text{Based}}$ )

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			
						F Change	df1	df2	Sig. F Change
1	.307 <sup>a</sup>	.094	.79	5.33350	.094	6.078	2	117	.003

a. Predictors: (Constants), Kemampuan Bertanya, Literasi Sains

b. Dependent Variable: Hasil Belajar

On Table 5 it can be seen that the *Adjusted R Square* is 0.79 or 79% of student learning outcomes at MTs Ngawi can be explained by the variables of scientific literacy and the ability to ask questions, while the remaining explained by variables outside the study such as self-motivation, quality of educators, supporting facilities, and others.

From the  $t$ , it can be seen that the significance value is  $0.017 < 0.05$ . Based on the Multiple Linear Regression Test, the ability to ask questions is 0.067, which means that the result of a significance value below 0.05 means that scientific literacy affects science learning outcomes with a regression value of 0.067. This study supports the results of research conducted by (Pangestu, 2019) Miko in 2019 which stated that there was a positive relationship between scientific literacy and student learning outcomes with a correlation value of 0.292 and a significant  $0.000 < 0.05$ .

Scientific literacy is the knowledge and understanding that a person has of the concepts and processes of science that are used in determining the right decisions from the knowledge he has acquired, as well as being involved in cultural and economic development (Aqil & Barat, 2017). Scientific literacy is needed when students learn global warming because in this material students are presented with many problems that exist in everyday life. Students are asked to actively read, understand, and identify problems about science in order to be able to answer a problem related to existing problems, so that it is expected to be able to improve their cognitive abilities.

The application of scientific literacy will be very useful to improve the ability of students to solve the problems they face. Scientific literacy trains students to create the right solution by utilizing the knowledge they get from the scientific concepts they have learned. So that scientific literacy is very important to be instilled in students. The concept of scientific literacy is expected to be able to instill a high sense of concern for oneself and the environment in dealing with problems of daily life and making decisions based on the knowledge of science that has been understood for students. If the level of scientific literacy in students is high, it will affect student learning outcomes. With the achievement of high learning outcomes and the ability of students to understand concepts, it can play a role in their way of dealing with everyday problems.

Learning in order to achieve scientific literacy is learning that is in accordance with the nature of science learning, namely learning that is oriented to process skills and scientific attitude skills and does not only emphasize memorizing knowledge. This learning will involve students actively because students will be given direct experience to help students gain an in-depth understanding of the natural surroundings. Students will be trained in collaborative work processes so that students have communication skills. The implementation of science learning can also be done by linking the concepts that have been obtained with everyday life. The achievement of scientific literacy learning is shown when students are able to understand what they have learned and then are able to apply it in solving problems in everyday life (Yuliaty, 2017).

The scientific literacy approach is also very useful to answer the challenges of an increasingly rapidly developing world. The more advanced the developing world will be, there will be many problems that arise and need the right solution. All these problems can be found solutions and solutions with the role of scientific literacy itself. So that the world of education contributes directly and has involvement in other fields that support the progress of a country. Due to the development of technology and science, a country will be left behind from other countries that are increasingly advanced if the country is not able to increase its resources. In this case, human resources are an important factor to support the progress of a country.

From the  $t$ , it can be seen that the significance value is  $0.011 < 0.05$ . Based on the Multiple Linear Regression Test, the ability to ask questions is 0.212, which means that the result of a significance value below 0.05 means that the ability to ask questions affects science learning outcomes with a regression value of 0.212. This is in line with research (Bisri, 2012) which states that from the results of his research by applying the ability to ask questions, student learning outcomes increase. Based on the  $t$ , a significance value of  $0.000 < 0.05$  was obtained so that there was a significant increase in learning outcomes. So it can be seen that there is a significant influence between the skills of asking questions and the results of science learning.

This study also supports research conducted by (Yafi, 2016) with results showing that the results of the correlation coefficient from hypothesis testing and a significant level of 5% obtained  $r_{count} > r_{table}$ , namely  $0.582 > 0.235$ . Based on these results, it is known that  $H_0$  is rejected and  $H_1$  of students in asking questions with learning outcomes has a positive relationship. This finding also supports the research conducted by Sahria, the result of which a correlation test has been carried out for  $r_{count} > r_{table}$ , which is  $3.929 > 1.96$ . This shows a significant correlation between the ability to ask questions and student learning outcomes.

Questioning skills are an important part of developing the quality of learning activities and are part of achieving results in activities managing the classroom climate (Zuraida et al., 2019). Research on the relationship between the ability to ask questions and student learning outcomes has been carried out by many previous researchers who suggested that the ability to ask questions and student learning outcomes had a positive relationship. The meaning of this positive relationship is that the higher the value of the ability to ask questions, the learning outcomes will also increase.

Based on this statement, it can be stated that frequently asking questions can be a factor to encourage and improve student learning outcomes. The important thing that might be considered in the results of this study is to show that there is a relationship between the ability to ask questions and learning outcomes, in which this questioning skill is important for students in the 21st century. The ability to ask questions is very important for students because asking questions becomes the basis for developing skills in formulating solutions to a problem at hand. In short, asking questions will encourage students to think critically and play an important role in choosing decisions to solve problems (Pratiwi et al., 2019).

The activity of asking questions in the learning process shows a form of delivering learning material that is not yet known and understood as well as the response of students to the teacher in delivering learning that is delivered orally. In addition, by asking the teacher can know and become a benchmark in thinking because asking questions is able to develop the creation of ideas and is able to improve understanding of lesson concepts and phenomena. The habit of asking questions and formulating answers is the key to active learning (Lamanepa & Panis, 2018).

Active and innovative learning is needed to build the ability to ask questions, because with varied learning with interesting information presentations, students will be encouraged to ask questions and explore deeper information so that they get an understanding of the concepts conveyed by the teacher. There are several ways that teachers can use to encourage students to ask questions, including providing motivation and opportunities for students to ask questions, using relevant and varied learning methods and media, and giving appreciation to students who ask questions through appropriate words or actions. that has been done by students to feel satisfied.

The importance of this student's ability to ask questions will help develop students' thinking patterns and become an opportunity to show attitudes, expertise in understanding the subject matter presented, develop an open attitude, ask and accept each other's opinions, develop students' responsibility for the questions submitted, realize the habits of students to think quickly and precisely, and to be responsive in responding to problems in building students' ability to communicate (Zuraida et al., 2019).

Together, the variables of scientific literacy and the ability to ask questions affect science learning outcomes at MTs Ngawi with a significance value of  $0.019 < 0.05$  and the  $t_{\text{calculated}}$  (6.078) is greater than  $F_{\text{table}}$  (3.07). The magnitude of the influence of the two independent variables is 79%. Student learning outcomes will be achieved if the supporting factors are also fulfilled. Not only cognitive aspects, but also aspects of skills or abilities that can encourage the success of the learning outcomes plan that has been formulated. That way the teacher does not only provide material but also must be able to develop abilities in students that are used for understanding concepts as well as achieving the goals of learning outcomes that have been determined. Asking questions will make learning more active and creative. The implementation of active learning will make it easier for students to be able to understand the concepts in the subject matter provided, so that it can be useful for improving learning outcomes for students themselves.

## CONCLUSION

Based on the results of the study, it can be seen that together the variables of scientific literacy and the ability to ask questions about the results studying science at MTs Ngawi with a significance value of  $0.019 < 0.05$  and the  $t_{\text{calculated}}$  (6.078) is greater than  $F_{\text{table}}$  (3.07) and the magnitude of the influence of the two variables is 79%.

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