

CORRELATION BETWEEN NATURALIST INTELLIGENCE AND SCIENCE LITERACY

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Abstract: This study aims to examine the relationship between naturalist intelligence and science literacy of elementary school students. The method used is a quantitative approach with a correlational design. The research population amounted to 114 students in grades V and VI from two elementary schools in Blitar City, with saturated sampling techniques. Data were collected through Likert scale questionnaires and science literacy tests that have been tested for validity and reliability. The data analysis uses Spearman Rank correlation because the data is not normally distributed. The results of the study showed that most of the students were in the medium category. The correlation coefficient of 0.346 with $p < 0.05$ showed a significant positive relationship with moderate strength. These findings confirm the importance of environment-based learning to improve students' science literacy.

Keywords: naturalist intelligence, science literacy, elementary school students.

1. INTRODUCTION

High-quality human resources depend on education to support national development and global competitiveness. Pada abad ke-21 pendidikan menuntut generasi muda agar memiliki kemampuan berpikir kritis, kreatif, komunikatif, dan kolaboratif (4C), yang didukung oleh penguasaan literasi sebagai kompetensi dasar (Muryati et al., 2022). According to UNESCO (2021) students need to develop various literacies, such as reading-writing literacy, numeracy, science, and digital literacy. Literasi tidak hanya kemampuan membaca dan menulis, tetapi juga kemampuan untuk memahami, menganalisis, dan menggunakan data dalam berbagai situasi kehidupan (Latif et al., 2022). Mastery of such literacy is a primary requirement for students to develop adaptively and productively in facing 21st-century educational challenges.

One form of literacy that plays a significant role in the elementary school learning process is science literacy. Science literacy is directly related to the ability to understand natural phenomena and make responsible decisions regarding the environment. Early provision of science literacy is needed to create quality and sustainability of a good living environment. Fajarwati et al. (2025) explains that strengthening science literacy helps students recognize natural phenomena, understand cause-and-effect relationships, and develop critical thinking

skills. This ability helps students understand the basic principles of science and use this knowledge to understand events occurring in their environment. Through science literacy, students learn to connect classroom learning material with real events, so that the understanding formed is not merely memorization, but rooted in observable experiences.

According to the report by OECD (2023) students' science literacy in Indonesia in 2022 was still in the low category. Indonesia ranked 69th out of 79 participating countries, placing it among the bottom ten. According to Yusmar & Fadilah (2023) the low level of science literacy is an important issue, as science literacy is not merely mastery of scientific concepts, but also the ability to apply that knowledge in making appropriate decisions in daily activities. This condition indicates that strengthening science literacy needs to be carried out from the elementary education level as the primary foundation for developing scientific thinking skills at subsequent educational stages. At the elementary school level, science literacy becomes an important foundation because at this stage students begin to form systematic thinking patterns, cultivate curiosity while training the ability to solve simple problems based on existing evidence. Early habituation of science literacy enables students to recognize scientific concepts more meaningfully and process information rationally. In addition, they acquire the thinking skills needed to face increasingly complex learning processes at the next level.

Initial observations at SD Negeri 3 Gedog, Blitar City, revealed that some students still showed low levels of environmental awareness, such as littering and insufficient efforts to maintain cleanliness, while others had demonstrated caring attitudes. Plant maintenance and use of classroom facilities were also not yet optimal. The school had utilized technology and the surrounding environment as part of learning, but their use as science learning resources had not been maximized. This condition affected the still-low understanding of science concepts and students' science literacy, particularly in applying subject matter to real life and environmental awareness.

In addition to enhancing scientific understanding, science literacy also develops scientific attitudes such as curiosity, concern for natural phenomena, and awareness of the sustainability of living organisms. Learning activities that utilize nature as an observation source also provide students with authentic experiences to understand patterns, structures, and regularities found in natural phenomena. Scientific understanding connected to the environment naturally fosters the development of naturalist intelligence, as students become accustomed to paying attention to natural details, recognizing biodiversity, and understanding the patterns of relationships between organisms (Suhirman, 2020).

Theoretically, in the naturalist intelligence proposed by Gardner (2011) in the theory of multiple intelligences, naturalist intelligence is the ability to recognize, differentiate, classify, and categorize elements in the natural environment, such as flora, fauna, and natural phenomena. Naturalist intelligence can change and improve. Naturalist intelligence is not a static ability, but a potential that can develop through experience, stimulation or interaction with the environment, and consistent practice. According to Irmawanty & Luliyana (2022) students with high naturalist intelligence will be more environmentally conscious and have the ability to carefully observe scientific phenomena, which can serve as a strategy for building students' ecological awareness. Thoha et al. (2023) also revealed that students with naturalist intelligence tend to be more interested in the environment, enjoy observing, and are more concerned with sustainability. This potential is considered relevant to science literacy, which demands observation, analysis, and problem-solving based on real evidence. When naturalist intelligence is applied in science learning, students tend to more easily understand science concepts related to real life. Naturalist intelligence can also motivate students to be more participatory in learning activities.

Science literacy and naturalist intelligence play an important role in individual development. A person with high science literacy will be more sensitive to the environment, able to make rational decisions, and maintain a healthy and responsible lifestyle. Meanwhile, naturalist intelligence helps students to recognize and appreciate nature, generate curiosity about living things, and develop empathy and responsibility toward ecosystems. Both abilities form an important foundation for shaping a generation that not only has cognitive intelligence but is also aware of life's sustainability.

Strengthening science literacy and naturalist intelligence among elementary school students is a strategic step in improving the quality of science education in Indonesia. With these abilities, students are expected to think critically, adopt a scientific attitude, and behave in an environmentally conscious manner. Students not only master concepts, but they also have the ability to apply them to real life. Di masa depan, anak-anak dengan good science literacy and naturalist intelligence will grow into intelligent, wise individuals who actively contribute to maintaining the balance of nature.

2. RESEARCH METHOD

This study was conducted by applying a quantitative approach with a correlational design. A correlational design is conducted without providing treatment or manipulation to the variables studied to determine the existence and strength of the relationship between two or more

variables. This study was conducted at two elementary schools in Blitar City, East Java, namely SD Negeri 3 Gedog and SD Negeri 2 Sananwetan. The population in this study included all students in grades V and VI at both schools totaling 114 students. The entire population was taken as the sample using a saturated sampling technique.

Data collection was carried out using two instruments: (1) a Likert-scale questionnaire with 18 valid statement items to measure naturalist intelligence based on three aspects, namely strong interest in nature, enjoyment of outdoor activities, and familiarity with animals and plants; and (2) a multiple-choice test comprising 20 valid items to measure science literacy based on three OECD competencies, namely explaining phenomena scientifically, designing and evaluating scientific inquiry, and interpreting and using scientific information for decision-making.

Instrument validity testing included content validity determined through expert assessment and analyzed using the *Aiken's V*, as well as empirical validity using *Product Moment Pearson*. Both instruments were tested for reliability using *Cronbach's Alpha*, questionnaire reliability test results ($\alpha = 0.762$), while test reliability results ($\alpha = 0.856$). The test instrument also underwent difficulty level and discriminating power tests. The Kolgkat kesukaran dan daya pembeda. Uji normalitas Kolmogorov-Smirnov digunakan sebagai uji prasyarat dalam teknik analisis data. Karena data literasi sains tidak berdistribusi normal (sig. < 0,001), sebagai uji nonparametrik dengan taraf signifikansi 5%, korelasi Rank Spearman digunakan untuk memeriksa hubungan antar variabel.

3. RESULTS AND DISCUSSION

Students' Naturalist Intelligence

The results showed that the majority of students had a level of naturalist intelligence classified in the moderate category. This finding indicates that students are sufficiently sensitive and interested in the natural environment, but have not yet developed optimally. The frequency distribution of students' naturalist intelligence is shown in Figure 1.

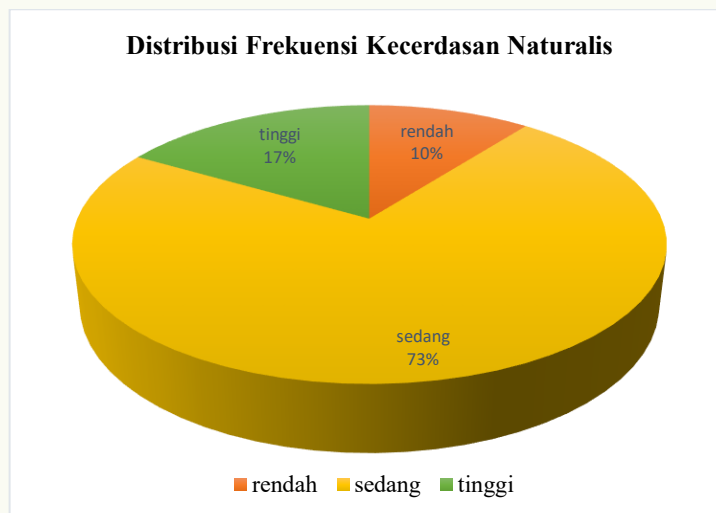


Figure 1. Frequency Distribution of Naturalist Intelligence

Figure 1 illustrates that elementary school students have generally been able to recognize and understand the natural environment around them, although that capacity still requires strengthening. Individuals with developed naturalist intelligence tend to have sensitivity to environmental changes and demonstrate responsibility in preserving nature, including sensitivity to changes and conservation efforts (Mawaddah & Helmi, 2025). The dominance of the moderate category indicates that most students have shown positive responses to the natural environment, but involvement in structured exploration and observation activities is still limited, so the development of naturalist intelligence has not yet reached an optimal level. Students' naturalist intelligence questionnaire response scores are shown in Figure 2.

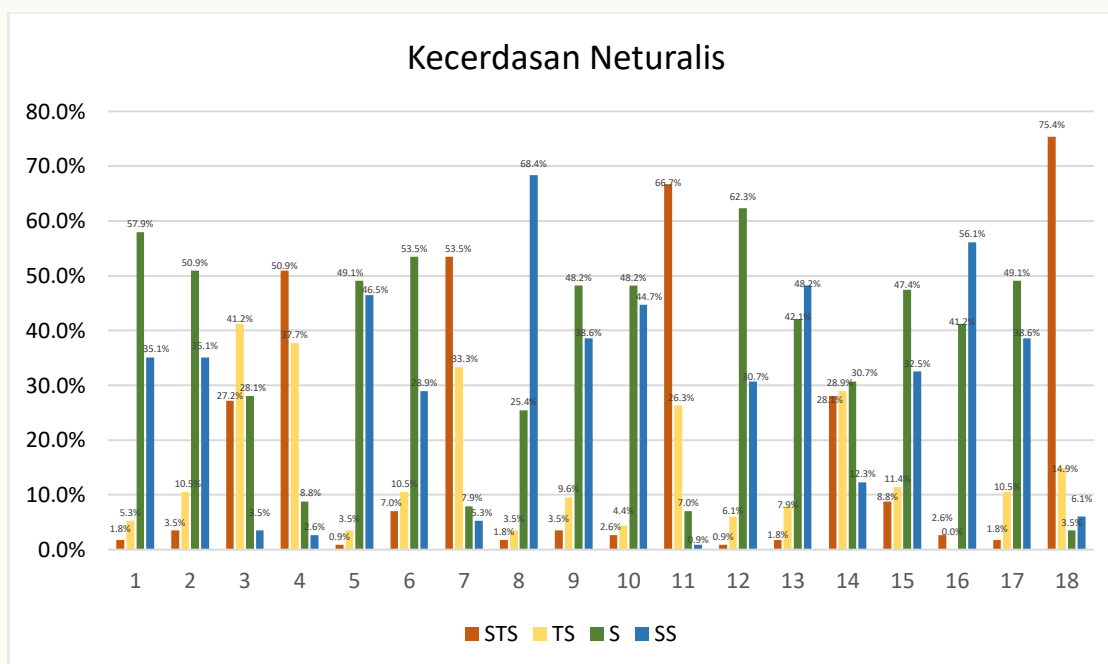


Figure 2. Percentage of Students' Naturalist Intelligence Questionnaire Responses

High scores on items related to strong attachment to nature (Figure 2) show that students have good awareness of the importance of environmental conservation. This is reflected in the negative statement “I feel I do not need to preserve the environment around me,” which received 75.4% strongly disagree responses. This high rejection rate indicates that students are sensitive to environmental changes and understand the importance of nature conservation, reflecting attitudes of care, responsibility, and awareness in maintaining ecosystem balance as part of naturalist intelligence. In addition, high scores were also found in the aspect of enjoyment of outdoor activities, as seen from the statement “I feel happy when invited to visit the zoo or city park” which received 68.4% strongly agree responses, showing that students enjoy direct interaction with the natural environment that can develop environmental sensitivity, curiosity, and learning engagement (Azzahra et al., 2025).

However, this condition is not yet fully aligned with the aspect of familiarity with animals and plants, particularly in the indicator of care through activities of caring for living organisms. This is evident in the negative statement about fear of animals, where some students still showed agreement responses, indicating a remaining fear of animals around them. This condition can affect the low level of direct interaction with living organisms and potentially hinder the development of caring attitudes, environmental sensitivity, and cognitive and social aspects of naturalist intelligence. Direct interaction with nature plays an important role in building knowledge, attitudes, and environmental sensitivity because real experiences can strengthen students’ emotional and social connection to the environment (Chawla, 2020).

Theoretically, naturalist intelligence relates to an individual’s ability to recognize, classify, and understand various natural phenomena (Gardner, 2011). Furthermore, according to Irmawanty & Luliyana (2022) naturalist intelligence is significantly related to environmental literacy and contributes to the formation of a caring attitude toward the environment, meaning that the higher the naturalist intelligence, the better the individual’s ability to understand the environment, which then drives the formation of environmental caring attitudes. Achievement levels still in the moderate category indicate that the learning environment is not yet fully ideal in developing naturalist intelligence and environmental literacy in a sustainable manner.

Students’ level of naturalist intelligence is influenced by learning experiences and school environmental support that encourages direct interaction with nature. Nature-based learning has been shown to improve observation skills and understanding of environmental phenomena Safitri & Haifaturrahmah (2025). Pada jenjang sekolah daschool level, students’ high curiosity is a potential that can be developed through directed environmental exploration activities. in a directed manner. Thus, although in the moderate category, this condition indicates great

opportunities for further development through learning that consistently integrates direct experiences with the natural environment.

Students’ Science Literacy

The research results showed that the level of science literacy in the majority of students was in the moderate category, with a larger proportion of students in the low category compared to the high category. This distribution indicates that basic concept understanding has relatively developed, but scientific reasoning ability and evidence evaluation are still limited. The frequency distribution of students’ science literacy ability is shown in Figure 3.

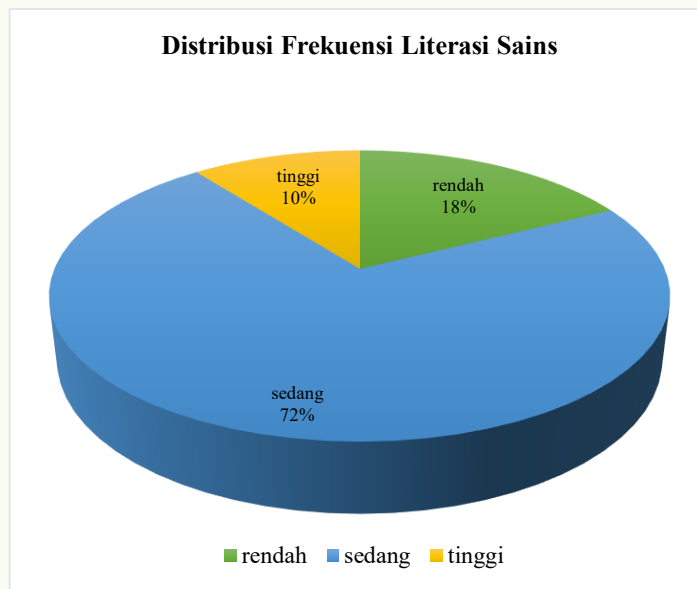


Figure 3. Frequency Distribution of Students’ Science Literacy

Based on Figure 3, the majority of elementary school students’ science literacy ability is in the moderate category. This finding is consistent with Nurjanah et al. (2025) which states that science literacy at the elementary school level is generally moderate, with the ability to explain scientific phenomena and interpret data needing strengthening (Figure 4).

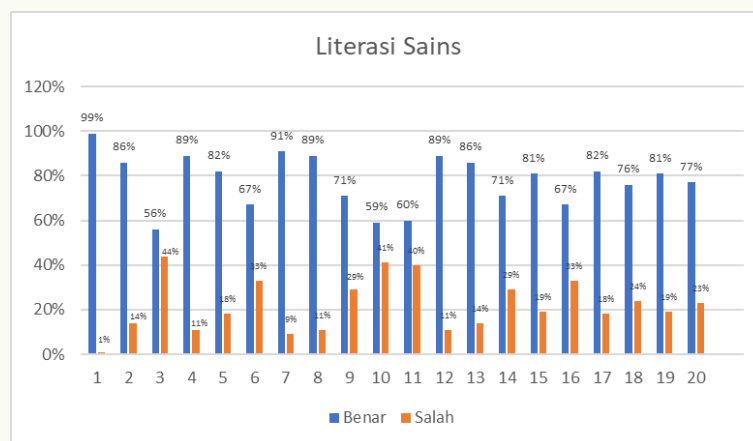


Figure 4. Percentage of Students’ Science Literacy Test Responses

Based on Figure 4, the analysis conducted on each test item shows considerable variation in achievement. The highest average correct responses were found in item number 1, which falls under the aspect of explaining phenomena scientifically with the indicator of identifying science concepts related to natural phenomena. In the topic of magnets, 99% of students answered correctly and only 1% answered incorrectly. This achievement shows that students have mastered science concepts that are concrete and close to everyday life. In contrast, item number 3, also in the aspect of explaining phenomena scientifically with the indicator of explaining everyday natural events based on learned science concepts, showed relatively lower student achievement. In the topic of Earth's rotation and revolution, 56% of students answered correctly, while 44% answered incorrectly. Although more students answered correctly, the error percentage on this item was the highest. This illustrates that students are not yet fully able to explain scientific phenomena in depth, so that ability still needs to be further developed.

This difference shows that students' science literacy has not developed evenly across every dimension. The ability to identify concepts is at the basic cognitive level, while the ability to explain phenomena requires deeper conceptual understanding and the ability to connect ideas with real-world situations. This is consistent with the idea that science literacy encompasses the ability to use scientific processes and knowledge to understand phenomena and make evidence-based decisions (Nurpratiwi et al., 2023), so that the moderate category achievement reflects still-limited student experience in scientific inquiry activities.

Theoretically, the science literacy profile in this study refers to the OECD (2023) framework, which describes science literacy as the ability to master scientific concepts, processes, and products, while also applying scientific knowledge and thinking to make rational decisions in daily life and participate as critical citizens. Science literacy is not only about understanding concepts, but also the ability to think scientifically to solve problems contextually (Hasnawati, 2024), making it a multidimensional competency involving knowledge, critical thinking skills, and application ability.

The level of science literacy is influenced by learning methods, learning experiences, and the relevance of material to students' life contexts. In addition, the quality of learning and environmental conditions also play a role in shaping students' attitudes and engagement (Indriyani & Suprapmanto, 2025), while exploration activities and the use of contextual media can increase interest and scientific thinking ability. As a result, learning must be designed contextually and based on direct experience, with the teacher's role connecting science concepts to real problems so that student understanding becomes more meaningful and science literacy develops optimally (Supriyono et al., 2025).

Correlation Between Naturalist Intelligence and Students' Science Literacy

Based the Spearman Rank correlation test results show a correlation coefficient of 0.346, and significance of < 0.001 . These results indicate a positive and significant correlation between science literacy and naturalist intelligence of elementary school students, with a moderate strength of relationship. This means that the higher the students' naturalist intelligence, the better their science literacy ability tends to be. However, the moderate strength of the relationship indicates that naturalist intelligence is not the only factor influencing science literacy. The following are the correlation test results between naturalist intelligence and students' science literacy (Table 1).

Table 1. Correlation Test Results

Variable X	Variable Y	Correlation Coefficient	Significance	Description
Naturalist Intelligence	Science Literacy	0,346**	$<0,001$	Moderately strong

Based on Table 1, the correlation test results showed that the relationship between naturalist intelligence and science literacy can be explained through shared cognitive aspects, such as observation, classification, and interpretation of phenomena, as well as direct experience with the environment that produces concrete and meaningful learning. In addition, the ability to connect concepts with everyday contexts and intrinsic motivational drives arising from interest in nature also increases students' active participation in the learning process (Afandi, 2020).

Conceptually, naturalist intelligence encompasses the ability to identify, classify, and understand natural phenomena (Armstrong, 2018). Students with high naturalist intelligence tend to have interest and a tendency to interact with the environment, and also a mampu mengenali pola dan mengelompokkan objek di alam. Kemampuan tersebut selaras dengan kemampuan literasi sains, terutama untuk menjelaskan fenomena secara ilmiah dan mengaitkan konsep dengan konteks nyata. Hasil ini sesuai dengan penelitian terdahulu yang menyatakan bahwa pengalaman berinteraksi dengan lingkungan berkontribusi terhadap pengembangan literasi sains, khususnya dalam menjelaskan fenomena dan membangun pemahaman kontekstual (Sermila et al., 2024). Students' sensitivity to the environment directly contributes to the formation of scientific attitudes and skills that form the foundation of science literacy.

The role of the environment as a link between the two variables is reinforced by experience-based learning, such as nature observation activities that provide authentic and meaningful experiences (Khodijah et al., 2024). However, the moderate correlation strength

indicates other contributing factors, such as learning quality and limited exploration experience, so development should be carried out through planned integration of inquiry and environmental exploration activities.

Learning that optimizes the environment as a learning medium provides opportunities for students to master concepts contextually through direct authentic experience, making it more meaningful than theoretical learning (Narieswari, 2022) Implementation of exploration-based and problem-solving learning models also encourages active student involvement in observing, analyzing, and systematically explaining scientific phenomena (Lina, 2024) In addition, the use of the school's surrounding environment as a contextual learning resource and strengthening intrinsic motivation through interest in nature also increase students' curiosity and involvement in learning (Afandi, 2020). Thus, the teacher's contribution becomes very important in creating exploration-, observation-, and direct experience-based learning so that science process skills and science literacy can develop optimally and in an integrated manner from the school level.

4. CONCLUSIONS AND SUGGESTIONS

CONCLUSIONS

There is a correlation between naturalist intelligence and science literacy of students at SD Negeri 3 Gedog and SD Negeri 2 Sananwetan, Blitar City, East Java of 0.346.

SUGGESTIONS

Elementary school teachers are advised to integrate environment-based learning in science through exploration activities, direct observation, and contextual problem-solving. Environmental learning resources should be optimized to increase student engagement and develop naturalist intelligence and science literacy, accompanied by strengthening of scientific activities such as inquiry and discussion to train critical thinking. Schools need to provide support through facilities and a conducive learning environment. Future researchers are advised to examine other variables affecting science literacy, such as motivation and reading interest, and to use more diverse research designs for more comprehensive results.

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