



Quantitative Descriptive Analysis of Science Curiosity in Science Learning Class V Elementary School

Linda Wahyuni, Fitri Nuraeni*, Hisny Fajrussalam

Universitas Pendidikan Indonesia, Bandung, Indonesia

✉ * fitrinuraeni@upi.edu

Article Info	Abstract
Keywords: <i>science curiosity; science learning; elementary school students; stretching; embracing; science practices</i> Received: 12/06/2026 Revised: 22/08/2026 Accepted: 04/09/2026	Background: Science curiosity is an important scientific attitude in science learning because it encourages students to seek information, understand scientific phenomena, and engage actively in the learning process. However, research mapping the science curiosity profile of elementary school students based on indicators of stretching, embracing, and science practices remains limited. Methods: This study uses a quantitative, descriptive approach. The research subjects consisted of 114 Grade V students from one of the elementary schools in Purwakarta Regency, selected using saturated sampling. Data were collected using a science curiosity questionnaire developed based on the Weible and Zimmerman indicators. Of the 30 items tested, 18 were declared valid, with a Cronbach's Alpha reliability of 0.796. Data were analyzed using descriptive statistics, including averages, percentages, standard deviations, and frequency distributions. Results: The results of the study show that students' science curiosity is generally in the high category. A total of 4.39% of students were in the very high category, 57.02% in the high category, 34.21% in the medium category, and 4.39% in the low category. Based on the indicators, stretching obtained the highest average score (27.01), followed by embracing (18.34) and science practices (17.29). These findings show that students' curiosity is more developed in the exploration aspect of knowledge than in involvement in scientific investigation practices. Conclusion: The findings indicate that elementary school students' science curiosity in science learning is generally in the high category. However, the science practice aspect still needs strengthening through learning activities that involve direct observation, experimentation, discussion, and scientific investigation.

INTRODUCTION

Natural Science (IPA) learning in elementary school has an important role in developing scientific thinking skills and shaping students' scientific attitudes from an early age (Hasana et al., 2025). Through science learning, students not only learn science concepts but are also trained to observe natural phenomena, ask questions, conduct investigations, and draw conclusions from

phenomena encountered in daily life (Abdullah et al., 2025). Thus, science learning is not only oriented toward mastering concepts but also toward developing students' scientific attitudes, including science curiosity, which reflects students' desire to explore and understand scientific phenomena (Husmar, 2025). Accordingly, fostering science curiosity should be considered an integral objective of elementary science learning, as it encourages students to actively explore and understand the natural world.

Curiosity is an intrinsic drive that encourages individuals to seek new information, understand phenomena, and explore new knowledge (Nasution et al., 2025). In the context of education, curiosity is an important factor that can increase student involvement in the learning process (Fitriya et al., 2025). In science learning, curiosity encourages students to explore scientific phenomena, ask questions, and investigate what they have learned (Waode, 2023). Fostering science curiosity is an integral objective of elementary science learning because it encourages students to actively explore and understand the natural world.

Curiosity in science learning can be identified through several indicators, namely stretching, embracing, and science practices, as stated by Weible & Zimmerman (2016). The stretching indicator reflects the student's desire to seek out and learn new things. The embracing indicator reflects students' courage in the face of challenges and uncertainties. Meanwhile, science practices reflect students' involvement in scientific activities such as observing, asking questions, recording observations, discussing, and conducting investigations. These three indicators are important aspects in the development of students' scientific attitudes towards science learning in elementary schools.

In science learning, curiosity plays a key role as the main driver of student learning activities. Students with high curiosity tend to be more active in asking questions, seeking additional information, and exploring observed phenomena (Ansya & Salsabilla, 2025). Some studies have also shown that curiosity is related to students' science skills and scientific thinking abilities (Waruwu & Suryani, 2026). In addition, curiosity can help students understand scientific concepts more deeply through exploration and inquiry (Bjerknes et al., 2024).

However, in elementary school practice, the development of students' curiosity is often not a primary focus in the learning process (Selvi, 2025). Learning that is still dominated by lecture methods and one-way information delivery causes students to have fewer opportunities to explore science phenomena actively (Falaah et al., 2026). This condition can hinder the development of students' curiosity because students tend to receive information passively without being encouraged to investigate or ask questions independently. In fact, the development of science curiosity requires a learning environment that provides opportunities for students to observe, ask questions, and seek answers through scientific exploration. (Husmar, 2025).

Previous studies have shown that science curiosity influences various aspects of science learning. Curiosity is known to increase student involvement in the learning process and encourage exploration of new information related to scientific phenomena (Rahayuningtyas et al., 2023). In addition, curiosity also plays a role in improving critical thinking skills and understanding of science concepts (Agustini et al., 2024). Other research shows that curiosity is related to students' academic achievement in science learning (Ali et al., 2024).

Although various studies have examined curiosity in science learning, most research still focuses on applying learning models to increase students' curiosity. Research that specifically maps the science curiosity of elementary school students, based on indicators of stretching, embracing, and science practices in the context of science learning in Indonesia, remains relatively limited (Selvi, 2025). In addition, few studies have comprehensively identified the tendencies toward exploratory and investigative curiosity among elementary school students. A multidimensional understanding of science curiosity is highly relevant to elementary science

education because curiosity is associated with students' engagement in inquiry processes and science learning, while scientific inquiry provides opportunities for students to explore questions, uncertainty, and evidence (Pedaste et al., 2021; Slim et al., 2022)

Recent research has shown that science curiosity can be meaningfully examined in relation to students' individual characteristics and their participation in inquiry- and design-based science learning (Slim et al., 2022). However, research in elementary science education has more frequently examined curiosity as an outcome of specific instructional interventions rather than describing its dimensions as a baseline profile. Therefore, mapping science curiosity based on the dimensions of stretching, embracing, and science practices is important because it provides a more specific understanding of students' tendencies to explore new knowledge, respond to challenges and uncertainty, and engage in scientific practices. This approach enables differences in the development of each dimension to be identified, allowing students' science curiosity to be understood beyond an overall score. Such information may help teachers identify dimensions of science curiosity that have developed well and those that still require support in science learning.

Based on this gap, this study aims to examine the level of science curiosity among elementary school students in science learning, both overall and across three dimensions: stretching, embracing, and science practices. This study provides empirical evidence by mapping the science curiosity profile of Grade V students across these three dimensions within the context of science learning in general. The profile is expected to provide baseline information for teachers to understand the dimensions of science curiosity that have developed and those that require further strengthening. The findings may also serve as a basis for identifying aspects of science learning that should provide greater opportunities for students to explore knowledge, respond to challenges, and engage in scientific practices.

METHODS

This study uses a quantitative, descriptive approach to describe the level of scientific curiosity among elementary school students in science learning. The descriptive method is used to systematically and factually reveal conditions or phenomena without giving special treatment to the research subject (Creswell & Creswell, 2017). The subjects of the study were 114 grade V students in one of the elementary schools in Purwakarta Regency. The sampling technique used is saturated sampling, in which all members of the population are included in the sample. The selection of grade V students is based on the assumption that they have received systematic science instruction, enabling them to demonstrate curiosity about scientific phenomena (Etikan et al., 2016).

Table 1. Distribution of Research Respondents

Classes	Number of Students	Percentage (%)
V-A	28	24,56
V-B	30	26,32
V-C	28	24,56
V-D	28	24,56
Total	114	100,00

Based on Table 1, the study respondents came from four relatively balanced classes. The even distribution of respondents provides a more representative picture of the profile of science curiosity among Grade V students in science learning. This balanced distribution reduces the possibility that the findings are dominated by the characteristics of a single class. Therefore, the

respondent composition is considered adequate to describe the science curiosity profile of the selected Grade V students in this study.

Data were collected using a questionnaire to measure students' level of scientific curiosity (Taherdoost & Hamta, 2017). The instrument was independently developed by the researcher, with reference to the science curiosity indicators proposed by Weible & Zimmerman (2016), namely, stretching, embracing, and science practices. Based on these indicators, the researcher compiled 30 statements that were adjusted to the context of science learning in elementary school. Instrument development is carried out through the preparation of instrument grids, writing statement items, and content validation through expert judgment to ensure the suitability of each item with the measured indicators (Yusoff, 2019). The questionnaire was designed to measure students' science curiosity in general science learning through their experiences of seeking scientific information, responding to challenges and uncertainty, and engaging in scientific activities, without being limited to any specific science topic.

Validation was carried out by three validators, consisting of one lecturer with expertise in Elementary School Science Education and two elementary school teachers experienced in science learning. The assessment of content validity uses the Index of Item-Objective Congruence (IOC) method developed by Rovinelli & Hambleton (1977). Items are declared eligible if they obtain an IOC value of ≥ 0.50 . The validation results showed that all statement items obtained IOC values ranging from 0.67 to 1.00, so all items were deemed worthy of testing.

Table 2. Science Curiosity Instrument Blueprint

Indicator	Operational Definition	Number of Items
Stretching	Students' desire to seek, learn, and understand new information in science learning	10
Embracing	Students' willingness to face challenges and uncertainties in science learning	10
Science Practices	Student involvement in scientific activities such as observation, experimentation, discussion, and simple investigation	10
Total		30

Operationally, the three dimensions represent different manifestations of students' science curiosity. Students demonstrating the *stretching* dimension are expected to show a tendency to seek information, explore phenomena, and expand their understanding beyond information directly provided by the teacher. The *embracing* dimension is reflected in students' willingness to face uncertainty, persist when encountering difficulties, and remain open to new explanations. Science practices are reflected in students' active participation in observing phenomena, asking questions, conducting investigations, recording evidence, discussing findings, and drawing conclusions. These forms of engagement are consistent with the view that elementary school students can participate meaningfully in scientific inquiry and develop their understanding through active investigation (Chen & Terada, 2021; Pedaste et al., 2021).

Before being administered in the main study, the instrument was pilot-tested with 26 Grade VI students who were not included in the main sample of 114 Grade V students. The pilot test was conducted to assess the empirical validity and reliability of the instrument before its administration in the main study. Item validity was examined using the Pearson Product-Moment correlation coefficient between each item's score and the total score using IBM SPSS Statistics version 21. The validity criterion was determined by comparing the calculated r value with the critical r value at the 0.05 significance level. With 26 respondents in the pilot study, the critical r

value was 0.388. Therefore, an item was considered valid if the calculated r value exceeded the critical r value. Based on the test results, 18 valid statements and 12 invalid statements were obtained. Invalid items were not used in the main research because they could not optimally represent the science curiosity construct. The reliability test using Cronbach's alpha yielded 0.796. The value exceeded the minimum limit of 0.70. It fell within the acceptable category according to the classification by George & Mallery (2024), so the instrument was considered to have good internal consistency and was suitable for use in the research.

Table 3. Summary of Instrument Test Results

Aspects	Results
Number of initial items	30
Number of valid items	18
Number of invalid items	12
R table	0,388
Cronbach's Alpha	0,796
Reliability Categories	Acceptable

To clarify the distribution of items after the validity test, valid items are regrouped based on science curiosity indicators. This grouping is important to ensure that the data analysis in the main research still represents the indicators of stretching, embracing, and science practices. The differences between the expert assessment and pilot test results reflect the distinct purposes of the two validation stages. The expert assessment was conducted to evaluate the relevance and alignment of the items with the intended science curiosity dimensions, whereas the pilot test examined the empirical performance of each item based on students' responses. In instrument development, content validity and empirical validity provide different types of evidence regarding instrument quality; therefore, items considered appropriate by experts may still fail to demonstrate adequate statistical validity when administered to respondents (Guo et al., 2021). Consequently, the 12 items that did not meet the empirical validity criteria were excluded from the main analysis, while the 18 items that met the criteria were retained.

Table 4. Distribution of valid items based on indicators

Indicator	Sub-Indicators	Item Valid	Quantity
Stretching	Seeking new information, exploring scientific phenomena, observing science phenomena, learning new science concepts independently	P1, P2, P4, P5, P7, P8, P9, P10	8
Embracing	Willingness to face uncertainty, persistence in solving science problems, confidence in participating during science learning	P11, P12, P16, P18, P20	5
Science Practices	Observation, experimentation, discussion, recording observations, drawing conclusions	P22, P24, P25, P29, P30	5

Data collection was conducted during the even semester of the 2025/2026 academic year after obtaining permission from the school and classroom teachers. Before the study was conducted, the researcher explained the purpose of the study and the questionnaire administration procedures to all respondents. Students were instructed to answer each statement independently based on their own experiences in science learning. During the questionnaire administration, students were not allowed to discuss their answers with classmates, while classroom teachers were instructed not to provide suggestions, encouragement, or guidance regarding specific answers. The researcher provided clarification regarding the instructions only

when necessary and did not influence students' responses. The questionnaire was administered sequentially to Classes V A, V B, V C, and V D, with approximately 25–30 minutes allocated to each class. The same instructions and procedures were used across all four classes to maintain consistency throughout the data collection process. During the administration, the researcher did not provide guidance regarding the respondents' answers to ensure that the data reflected their actual conditions. After all questionnaires had been collected, the researcher checked the completeness of the responses before proceeding to data processing and analysis. The verified data were then coded and prepared for descriptive statistical analysis using IBM SPSS Statistics version 21.

The questionnaire uses a five-point Likert scale with the options Always, Often, Sometimes, Rarely, and Never to measure subjective attitudes and perceptions (Joshi et al., 2015). Responses on such scales can depend on individual respondents' interpretations (Kankaraš & Capecchi, 2025), so the response categories are clearly defined to avoid ambiguity and differences in interpretation. This is in line with the importance of clarity in the preparation of instrument items to represent constructs (Jebb et al., 2021), and shows that the design of response categories in questionnaires also affects the quality of the data obtained (Dell-Kuster et al., 2014).

Table 5. Questionnaire Frequency Category

Shoes	Category	Frequency Limitation
5	Always	81%–100%
4	Frequent	61%–80%
3	Sometimes	41%–60%
2	Rare	21%–40%
1	Never	0%–20%

The number of statements consists of positive and negative items. Scores for positive statements are given from 5 (Always) to 1 (Never), while negative statements are scored inversely (reverse scoring) so that all items have a consistent measurement direction. The use of reverse scoring aims to reduce respondents' tendency to give uniform answers (acquiescence bias) and improve the quality of data interpretation from Likert-scale-based instruments (García-Fernández et al., 2022). Data analysis was carried out using descriptive statistics, including the mean, percentage, standard deviation, and frequency distribution for each science curiosity indicator. Categorization was carried out by dividing scores into certain intervals, referring to Sugiyono (2019) to facilitate data interpretation.

Table 6. Interval Category
Science Curiosity

Score Interval	Category
1,00–1,80	Very Low
1,81–2,60	Low
2,61–3,40	Medium
3,41–4,20	High
4,21–5,00	Very High

Although the instrument passed validity and reliability tests, the use of self-report questionnaires still introduces subjective bias among respondents. Therefore, the results of the study need to be interpreted carefully, especially since the data illustrate students' perceptions of their own scientific curiosity. In addition, students' responses may have been influenced by their

individual interpretations of the questionnaire items and their tendency to provide socially desirable answers. Despite these limitations, the instrument provides useful information for describing the overall profile of students' science curiosity in the context of this study.

This study used a structured self-report questionnaire and did not include open-ended interviews because its primary objective was to quantitatively describe students' science curiosity based on the three dimensions. Nevertheless, the absence of interview data limits the ability of the study to provide deeper explanations of the reasons underlying students' responses. Previous research has indicated that self-report measures may be influenced by differences in the standards respondents use to evaluate their own behaviors (Lira et al., 2022). Therefore, future studies could complement questionnaire data with interviews or classroom observations to provide a more comprehensive understanding of students' science curiosity.

RESULT AND DISCUSSION

Based on the results of a descriptive statistical analysis of 114 elementary school grade V students, an overview of students' level of science curiosity in science learning was obtained, as presented in Table 7.

Table 7. Distribution of Students' Science Curiosity Levels

Category	Frequency	Percentage (%)
Low	5	4,39
Medium	39	34,21
High	65	57,02
Very High	5	4,39
Total	114	100,00

Based on Table 7, most students were in the high category, with 65 students (57.02%), followed by the medium category, with 39 students (34.21%). Meanwhile, the low and very high categories were found in only 5 students (4.39%), respectively. These findings show that, in general, students have strong curiosity about science. This distribution suggests that science curiosity has developed positively among most Grade V students, although differences in curiosity levels remain evident across individual students. The high level of science curiosity indicates that students have an urge to understand the phenomena studied and a desire to acquire new information during the learning process. Curiosity is an internal drive that motivates students to seek explanations, explore information, and expand their understanding of the unknown. In the context of science learning, high curiosity enables students to be more active in observing phenomena, asking questions, and seeking explanations of the concepts they learn. This tendency suggests that students are willing to engage in learning activities that require them to seek explanations and explore scientific ideas independently.

These findings are consistent with Otto et al. (2020), who found that students' fascination and engagement with science support deeper learning and a more meaningful understanding of scientific concepts. Thus, high science curiosity can be an important capital for students to be more active in understanding, connecting, and evaluating science concepts. In addition, Murayama et al. (2019) explain that curiosity can be understood as a process that encourages individuals to seek information and gain intrinsically valuable learning experiences. Both studies emphasize that curiosity is closely related to students' motivation to learn and to their active involvement in constructing scientific understanding.

Jirout et al. (2024) explain that children's curiosity develops at various ages and in various contexts, so learning needs to provide an environment that offers space for children to ask

questions, explore, and build understanding. In the context of elementary school science learning, Wardana et al. (2025) also show that curiosity has an important role in supporting students' conceptual understanding and learning outcomes. These findings highlight the importance of creating science learning environments that encourage questioning, exploration, and active engagement with scientific phenomena. Such learning environments can help sustain and further develop students' science curiosity over time. Thus, the high level of science curiosity observed in this study provides a strong foundation for implementing active, student-centered science learning. To obtain a more detailed picture, an analysis of the items with the highest and lowest scores was carried out as presented in Table 8.

Table 8. Summary of Statistics of Science Curiosity Items

Item Aspect	Item	Red	Category
Highest score	P11	4,21	Very High
High score	P10	3,97	High
Medium score	P7	2,61	Medium
Lowest score	P8	2,10	Low

Based on Table 8, item P11 obtained the highest average score of 4.21 and was in the very high category. Item P10 also received a high score with an average score of 3.97. The high scores on both items show that students tend to keep trying to follow science learning and face difficulties that arise during the learning process. This condition indicates that students' curiosity is not only manifested in the desire to acquire new information but also in the willingness to remain engaged in learning activities despite challenges.

The findings are in line with Hidi & Renninger (2020) who emphasize that curiosity and interest are closely related to students' learning processes and engagement, and play an important role in supporting learning development. This means that curiosity can support students' involvement in learning, especially when they encounter material or tasks that require cognitive effort. Thus, high scores on P10 and P11 indicate that most students are well prepared to remain engaged in science learning despite challenges.

In contrast, item P8 had the lowest score, with an average of 2.10, and was in the low category, while item P7 had an average of 2.61 and was in the medium category. Lower scores on items P7 and P8 indicate that the ability to explore knowledge independently has not developed evenly across all students. These findings indicate that some students still tend to rely on classroom-based sources of information rather than exploring them more broadly. Thus, although students' science curiosity is generally in the high category, its development is not uniform across all aspects. Further analysis based on indicators shows that all science curiosity indicators are in the high category, as presented in Table 9.

Table 9. Science Curiosity Level Based on Indicators

Indicator	Red	Std. Deviation	Category
Stretching	27,01	4,606	High
Embracing	18,34	3,054	High
Science Practices	17,29	3,079	High

Before interpreting the results, note that the number of valid items for each indicator varies. The stretching indicator consists of 8 items, while embracing and science practices each consist of 5 items. Therefore, comparisons between indicators should be made carefully, as the average total score can be affected by the number of items. However, the analysis shows that the three science curiosity indicators fall into the high category.

These findings indicate that students have strong scientific curiosity in science learning, as reflected in knowledge exploration, readiness to face challenges, and involvement in scientific activities. Although all three indicators are categorized as high, the scores show slight variations across the dimensions of science curiosity. These variations provide a more detailed understanding of students' strengths in each dimension. To clarify the picture of the level of science curiosity in each indicator, the results of the analysis are presented visually in Figure 1.

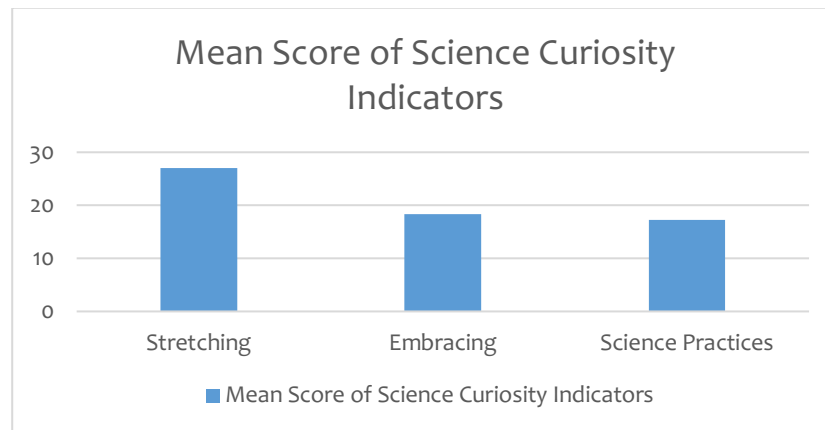


Figure 1. Science Curiosity Average by Indicator

Based on Table 9 and Figure 1, the stretching indicator obtained the highest average value of 27.01 with a standard deviation of 4.606. The embracing indicator had an average of 18.34 with a standard deviation of 3.054, while the science practices indicator had the lowest average of 17.29 with a standard deviation of 3.079. Although all indicators are in the high category, differences in achievement indicate variation in students' characteristics of science curiosity. These differences provide an overview of the variation in the development of each dimension of students' science curiosity. The high score on the stretching indicator indicates that students have a strong tendency to seek new information, understand science phenomena, and expand their knowledge. These findings show that students' curiosity develops more in the exploration aspect of knowledge. Murayama et al. (2019) explain that curiosity is related to the process of seeking information that arises when individuals are driven to learn. Therefore, the high stretching indicator indicates that students have a strong urge to understand the various science phenomena encountered during the learning process.

From a classroom learning perspective, the findings can also be attributed to Jirout et al. (2022) who developed the Curiosity in Classrooms Framework to observe learning practices that support curiosity. The framework shows that students' curiosity can be facilitated through a learning environment that provides opportunities to ask questions, explore, and actively engage in the learning process. Thus, the high stretching indicator in this study indicates good potential for developing science learning that encourages knowledge exploration. This condition indicates that students already have a strong tendency to explore scientific knowledge when supported by an appropriate learning environment.

The embracing indicator is also in the high category. These findings show that students are quite open to the challenges and uncertainties that arise during the science learning process. The high level of this indicator is reflected in the high scores on items P10 and P11, which indicate that students continue striving to learn despite difficulties. Noordewier & van Dijk (2020) explain that curiosity arises when individuals become aware of a gap between what they know and what they want to know, motivating them to seek new information to reduce uncertainty. In the context of science learning, openness to challenges is important because understanding scientific phenomena often involves uncertainty, testing ideas, and revising understanding in light of evidence.

However, the science practices indicator scored the lowest among the indicators. These findings show that student involvement in scientific activities such as observation, data recording, scientific discussion, and simple investigation has not developed as strongly as knowledge exploration and openness to challenges. In other words, students' curiosity is more pronounced in their desire to learn new information than in their direct involvement in the scientific investigation process. This finding suggests that the development of students' science curiosity has not yet been balanced across all dimensions.

The low score for science practices relative to other indicators indicates that student involvement in scientific activities still needs strengthening. Solihati (2021) found that the scientific approach to science learning can increase students' engagement in classroom activities. Meanwhile, Osborne & Pimentel (2023) emphasized the importance of science education in equipping students to understand scientific information, use evidence, and reason critically amid a growing body of information. Akmal (2021) also explained that teacher-centered, conventional learning tends to limit students' opportunities to explore and develop knowledge independently. Thus, science learning not only needs to encourage students to want to know new information, but also needs to get students used to being involved in scientific processes such as observing, investigating, collecting data, and concluding observations.

These findings are consistent with Dah et al. (2024), who highlighted that inquiry-based science learning provides students with opportunities to ask questions, investigate phenomena, and construct their own understanding through active learning experiences. Meanwhile, Slim et al. (2022) emphasized that curiosity is an important individual factor in inquiry- and design-based science learning, influencing students' learning processes and outcomes in elementary education. Both studies support the importance of inquiry learning. However, with different emphases: Dah et al. (2024) focused on the positive impact of inquiry-based science learning on students' learning processes, whereas Slim et al. (2022) highlighted curiosity as an individual difference that contributes to students' engagement and conceptual learning in science education.

In line with this, Rosyani et al. (2025) show that guided inquiry-based learning can support the understanding of science concepts of elementary school students. The findings reinforce the argument that science learning needs to provide space for students to engage in inquiry, concept exploration, and proofing through more active learning activities. Such learning experiences encourage students to participate directly in scientific activities while constructing their understanding of science concepts. Thus, strengthening science practices can be done through learning that not only conveys concepts, but also encourages students to experience the scientific process directly.

The low score for science practices relative to other indicators indicates a gap between exploratory and investigative curiosity. Students have a strong desire to learn new information, but their involvement in the process of acquiring knowledge through scientific practice remains relatively low. The National Academies of Sciences, Engineering (2021) affirms that, from an early age, children can engage with scientific concepts and practices, as well as develop curiosity about the world around them. Therefore, science learning needs to provide more opportunities for students to experience the scientific process firsthand, rather than just receiving conceptual information.

These findings are also relevant to the context of science learning in Indonesia. The Independent Curriculum places science process skills as an important part of learning science. Phase C Learning Outcomes emphasize the ability to observe, investigate, collect data, analyze information, and communicate the results of investigations as part of students' learning experiences (Kementerian Pendidikan, Kebudayaan, Riset, 2022). This curriculum orientation is expected to facilitate the development of students' science curiosity through meaningful scientific experiences. Thus, conceptually, the curriculum has provided sufficient space to facilitate the development of science curiosity through investigative activities.

However, the lower science practices indicator shows that the development of students' curiosity is still more evident in information seeking than in involvement in the scientific investigation process. This finding indicates that further efforts are needed to strengthen students' involvement in scientific investigation activities. Overall, the results of this study show that the science curiosity of elementary school students has developed well. However, its development is still stronger in knowledge exploration than in scientific investigative practices.

Overall, the results of the study show that the science curiosity of elementary school students is in the high category, both in general and in all three indicators. However, the indicator profile shows that students' curiosity is predominantly developed in knowledge exploration or stretching rather than in scientific or science practices. These findings show that students already have a good foundation of curiosity. However, there is still room to strengthen the investigative dimension so that the development of science curiosity is more balanced across the indicators of stretching, embracing, and science practices.

Based on these findings, science learning needs to be designed not only to foster students' desire to acquire new information, but also to provide a hands-on investigative experience. Teachers can strengthen the science practice dimension through inquiry-based learning, simple experiments, environmental observations, scientific discussions, and project-based learning. Such learning experiences are expected to support the balanced development of all dimensions of science curiosity. Through this strategy, students not only understand the concepts of science but also experience the scientific process by observing, investigating, collecting data, using evidence, and drawing conclusions from observations.

However, this study has some limitations. The study respondents came from only one elementary school, so the results need to be generalized carefully. In addition, the use of self-report questionnaires allows for a subjective bias among respondents, and descriptive research designs have not been able to explain the factors that affect students' science curiosity in depth. Therefore, further research is recommended to involve a wider sample, use a mixed-methods approach, and examine factors that contribute to the development of students' scientific curiosity.

CONCLUSION

Based on the results of the study, Grade V elementary school students' science curiosity in science learning was generally categorized as high. This finding indicates that students demonstrated a strong tendency to understand new information, explore scientific phenomena, and engage in the learning process. Overall, the findings provide an empirical description of the level of science curiosity among Grade V students in science learning. Based on the analysis of the three dimensions, namely stretching (efforts to expand knowledge), embracing (openness to new ideas), and science practices, all dimensions were categorized as high. The stretching dimension obtained the highest score, whereas science practices obtained the lowest score, although they remained in the high category. This pattern indicates that students tended to demonstrate stronger curiosity in expanding their scientific knowledge than in engaging in science practices. This study provides a multidimensional profile of Grade V students' science curiosity based on stretching, embracing, and science practices. The profile indicates that students' science curiosity is manifested not only through their desire to acquire new knowledge but also through their openness to ideas and engagement in scientific practices. The relatively lower score for science practices suggests that this dimension warrants greater attention in the development of science learning at the elementary school level.

DECLARATION OF GENERATIVE AI

During the preparation of this work, the authors used ChatGPT to assist with brainstorming ideas and improving the wording and sentence structure of the manuscript, and Grammarly Pro to assist with grammar, spelling, and language editing. After using these tools, the authors reviewed and edited the content as needed and takes full responsibility for the content of the publication.

CONFLICTING INTEREST STATEMENT

The author(s) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Linda Wahyuni: Conceptualization, Methodology, Data Curation, Formal Analysis, Investigation, Writing - Original Draft, Visualization. **Fitri Nuraeni:** Supervision, Validation, Writing - Review & Editing. **Hisny Fajrussalam:** Supervision, Validation, Writing - Review & Editing

REFERENCES

- Abdullah, G., Arifin, I. N., Sianu, L., Suleman, A. R., & Doe, R. (2025). *Pembelajaran IPA Di Sekolah Dasar* (E. Efitra & U. Inayah, Eds.). PT. Sonpedia Publishing Indonesia.
- Agustini, R., Meilanie, R. S. M., & Pujiastuti, S. I. (2024). Enhancing Critical Thinking and Curiosity in Early Childhood Through Inquiry-Based Science Learning. *Aulad: Journal on Early Childhood*, 7(3), 734–743. <https://doi.org/10.31004/aulad.v7i3.780>
- Akmal, A. U. (2021). Analisis Etnosains Dalam Pembelajaran IPA di Sekolah Dasar (SD) Kota Padang Dan Bukittinggi. *Jurnal Inovasi Pendidikan Dan Pembelajaran Sekolah Dasar*, 4(2), 68–77. <https://doi.org/10.24036/jippsd.v4i2.111385>
- Ali, N., Abu Khurma, O., & Jarrah, A. (2024). Intellectual Curiosity as a Mediator between Teacher–Student Relationship Quality and Emirati Science Achievement in PISA 2022. *Education Sciences*, 14(9), 1–14. <https://doi.org/10.3390/educsci14090977>
- Ansyah, Y. A., & Salsabilla, T. (2025). *Membangun Pemahaman Sains Sejak Dini*. Cahya Ghani Recovery.
- Bjerknes, A. L., Wilhelmsen, T., & Foyn-Bruun, E. (2024). A Systematic Review of Curiosity and Wonder in Natural Science and Early Childhood Education Research. *Journal of Research in Childhood Education*, 38(1), 50–65. <https://doi.org/10.1080/02568543.2023.2192249>
- Chen, Y.-C., & Terada, T. (2021). Development and validation of an observation-based protocol to measure the eight scientific practices of the next generation science standards in K-12 science classrooms. *Journal of Research in Science Teaching*, 58(10), 1489–1526. <https://doi.org/https://doi.org/10.1002/tea.21716>

- Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications.
- Dah, N. M., Noor, M. S. A. N., Kamarudin, M. Z., & Azziz, S. S. S. A. (2024). The impacts of open inquiry on students' learning in science: A systematic literature review. *Educational Research Review*, 43, 100601. <https://doi.org/10.1016/j.edurev.2024.100601>
- Dell-Kuster, S., Sanjuan, E., Todorov, A., Weber, H., Heberer, M., & Rosenthal, R. (2014). Designing questionnaires: Healthcare survey to compare two different response scales. *BMC Medical Research Methodology*, 14(1), 1–13. <https://doi.org/10.1186/1471-2288-14-96>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of Convenience Sampling and Purposive Sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Falaah, M. S., Revandi, I. M., Ramadhani, C. F., & Alpusari, M. (2026). Analisis Strategi Pembentukan Karakter Rasa Ingin Tahu Siswa Sekolah Dasar Oleh Guru Sdn 192 Pekanbaru. *Alpen: Jurnal Pendidikan Dasar*, 10(1), 2580–9075. <https://doi.org/https://doi.org/10.24929/alpen.v10i1.675>
- Fitriya, E., Nurhayati, F., Rosulina, D., Santora, P., Kurahman, O., & Tarsono. (2025). Peran Motivasi Intrinsik dan Ekstrinsik dalam Meningkatkan Hasil Belajar Pendidikan Agama Islam. *Didaktika: Jurnal Kependidikan*, 14(1), 1055–1064. <https://doi.org/https://doi.org/10.58230/27454312.1750>
- García-Fernández, J., Postigo, Á., Cuesta, M., González-Nuevo, C., Menéndez-Aller, Á., & García-Cueto, E. (2022). To be Direct or not: Reversing Likert Response Format Items. *Spanish Journal of Psychology*, 25(8), 1–9. <https://doi.org/10.1017/SJP.2022.20>
- George, D., & Mallery, P. (2024). *IBM SPSS Statistics 29 Step by Step*. A Simple Guide and Reference. <https://doi.org/https://doi.org/10.4324/9781032622156>
- Guo, S., Liu, E., & Liu, C. (2021). Development and validation of an instrument to assess Chinese upper-level elementary students' attitudes towards science. *International Journal of Science Education*, 43(14), 2374–2401. <https://doi.org/https://doi.org/10.1080/09500693.2021.1963879>
- Hasana, S. N. H., Firdausiah, A. S., & Prayogo, M. S. (2025). Pengembangan Program Pembelajaran IPA Sains Untuk Anak SD/MI Dalam Menumbuhkan Sikap Ilmiah Dan Kemampuan Berpikir Kritis. *Jurnal Penelitian Nusantara*, 1(November), 22–25.
- Hidi, S. E., & Renninger, K. A. (2020). On educating, curiosity, and interest development. *Current Opinion in Behavioral Sciences*, 35, 99–103. <https://doi.org/10.1016/j.cobeha.2020.08.002>
- Husmar, N. A. (2025). Menumbuhkan Rasa Ingin Tahu Siswa Melalui Penbelajaran Ipa. *Jurnal Ilmiah Multidisiplin Mahasiswa Dan Akademisi*, 1(3), 12–21. <https://doi.org/https://doi.org/10.64690/intelektual.v1i3.123>
- Jebb, A. T., Ng, V., & Tay, L. (2021). A Review of Key Likert Scale Development Advances: 1995–2019. *Frontiers in Psychology*, 12(May), 1–14. <https://doi.org/10.3389/fpsyg.2021.637547>
- Jirout, J. J., Evans, N. S., & Son, L. K. (2024). Curiosity in children across ages and contexts. *Nature Reviews Psychology*, 3(9), 622–635. <https://doi.org/10.1038/s44159-024-00346-5>
- Jirout, J. J., Zumbunn, S., Evans, N. S., & Vitiello, V. E. (2022). Development and Testing of the Curiosity in Classrooms Framework and Coding Protocol. *Frontiers in Psychology*, 13(April). <https://doi.org/10.3389/fpsyg.2022.875161>
- Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology*, 7(4), 396–403. <https://doi.org/10.9734/bjast/2015/14975>

- Kankaraš, M., & Capecchi, S. (2025). Neither agree nor disagree: use and misuse of the neutral response category in Likert-type scales. *Metron*, 83(1), 111–140. <https://doi.org/10.1007/s40300-024-00276-5>
- Kementerian Pendidikan, Kebudayaan, Riset, dan T. (2022). *Keputusan Kepala Badan Standar, Kurikulum, dan Asesmen Pendidikan Nomor 033/H/KR/2022 tentang Capaian Pembelajaran pada Pendidikan Anak Usia Dini, Jenjang Pendidikan Dasar, dan Jenjang Pendidikan Menengah pada Kurikulum Merdeka*.
- Lira, B., O'Brien, J. M., Peña, P. A., Galla, B. M., D'Mello, S., Yeager, D. S., Defnet, A., Kautz, T., Munkacsy, K., & Duckworth, A. L. (2022). Large studies reveal how reference bias limits policy applications of self-report measures. *Scientific Reports*, 12(1), 1–12. <https://doi.org/10.1038/s41598-022-23373-9>
- Murayama, K., FitzGibbon, L., & Sakaki, M. (2019). Process Account of Curiosity and Interest: A Reward-Learning Perspective. *Educational Psychology Review*, 31(4), 875–895. <https://doi.org/10.1007/s10648-019-09499-9>
- Nasution, I. H., Ama, R. G. T., & Baroroh, D. N. (2025). Rasa Ingin Tahu dan Minat Baca pada Siswa Sekolah Dasar. *Liberosis: Jurnal Psikologi Dan Bimbingan Konseling*, 13(2), 141–150.
- National Academies of Sciences, Engineering, and M. (2021). *Science and Engineering in Preschool Through Elementary Grades: The Brilliance of Children and the Strengths of Educators*. The National Academies Press. <https://doi.org/10.17226/26215>
- Noordewier, M. K., & van Dijk, E. (2020). Deprivation and discovery motives determine how it feels to be curious. *Current Opinion in Behavioral Sciences*, 35, 71–76. <https://doi.org/10.1016/j.cobeha.2020.07.017>
- Osborne, J., & Pimentel, D. (2023). Science Education in an Age of Misinformation. *Science Education*, 107(3), 553–571. <https://doi.org/10.1002/sce.21790>
- Otto, S., Körner, F., Marschke, B. A., Merten, M. J., Brandt, S., Sotiriou, S., & Bogner, F. X. (2020). Deeper learning as integrated knowledge and fascination for Science. *International Journal of Science Education*, 42(5), 807–834. <https://doi.org/10.1080/09500693.2020.1730476>
- Pedaste, M., Baucal, A., & Reisenbuk, E. (2021). Towards a science inquiry test in primary education: development of items and scales. *International Journal of STEM Education*, 8(1). <https://doi.org/10.1186/s40594-021-00278-z>
- Rahayuningtyas, A. C., Utami, B., & Khasanah, A. N. (2023). The Effect of the Environmental Exploration Approach on Curiosity, Critical Thinking Skills, and Science Learning Outcomes. *Jurnal Penelitian Pendidikan IPA*, 8(2), 98–104. <https://doi.org/10.26740/jppipa.v8n2.p98-104>
- Rosyani, W. A., Nuraeni, F., & Fajrussalam, H. (2025). Pengaruh Model Inkuiri Terhadap Berbantuan PhET Simulation Terhadap Pemahaman Konsep IPA Peserta Didik SD. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, 10(3), 303–313. <https://doi.org/0.23969/jp.v10i3.27769>
- Rovinelli, R. J., & Hambleton, R. K. (1977). On the Use of Content Specialists in the Assessment of Criterion-Referenced Test Item Validity. *Dutch Journal of Educational Research*, 2, 49–60.
- Selvi, N. (2025). Journal of Integrative Elementary Education Mengembangkan Rasa Ingin Tahu dan Kepedulian Lingkungan melalui Pembelajaran IPA di Sekolah Dasar Nurhayati Selvi Universitas Islam Makassar optimalnya pengembangan sikap peduli lingkungan . Padahal , pembelajar. *Journal of Integrative Elementary Education*, 1(1), 9–15.

- Slim, T., van Schaik, J. E., Dobber, M., Hotze, A. C. G., & Raijmakers, M. E. J. (2022). Struggling or Succeeding in Science and Technology Education: Elementary School Students' Individual Differences During Inquiry- and Design-Based Learning. *Frontiers in Education*, 7(842537), 1–20. <https://doi.org/10.3389/feduc.2022.842537>
- Solihati, H. (2021). Application of The Scientific Approach to Improve Student Activity in The Thematic Learning in Class VI B SDN Karanganyar Kawalu District, Tasikmalaya City. *Heni. In Social, Humanities, and Educational Studies (SHES): Conference Series*, 4(5), 622–627. <https://doi.org/10.20961/shes.v4i5.66064>
- Sugiyono. (2019). *Metode Penelitian Kuantitatif Kualitatif dan R&D* (2nd ed.). Alfabeta.
- Taherdoost, H., & Hamta, G. (2017). Validity and Reliability of the Research Instrument ; How to Test the Validation of a Questionnaire / Survey in a Researchfile:///C:/Users/admin/Desktop/RISACHI REPORT 2021/reference B/2190-8050-1-PB-1 SOCIO.pdf. *International Journal of Sport, Exercise & Training Sciences*, 5(3), 27–36. <https://hal.science/hal-02546799/document>
- Waode, S. S. (2023). Eksplorasi Implementasi Model Inkuiri Terbimbing Dalam Pembelajaran IPA Untuk Meningkatkan Kemampuan Berpikir Kritis dan Rasa Ingin Tahu Siswa Sekolah Dasar Di SD Negeri 2 Wadaga. *MISOOL: Jurnal Pendidikan Dasar*, 5(1), 33–47. <https://doi.org/10.47945/misool.v5i1.1904>
- Wardana, T. K., Widodo, W., & Suryanti, S. (2025). Curiosity and Spatial Interest as Mediators of Conceptual Understanding and Learning Outcomes in Elementary Science Education. *Journal of Innovation and Research in Primary Education*, 4(4), 3631–3639. <https://doi.org/10.56916/jirpe.v4i4.2392>
- Waruwu, R., & Suryani, E. (2026). Hubungan Keterampilan Proses Sains dan Rasa Ingin Tahu Siswa Kelas IV SD Gugus Diponegoro. 9(3), 3161–3166. <https://doi.org/10.54371/jiip.v9i3.10961>
- Weible, J. L., & Zimmerman, H. T. (2016). Science curiosity in learning environments: developing an attitudinal scale for research in schools, homes, museums, and the community. *International Journal of Science Education*, 38(8), 1235–1255. <https://doi.org/10.1080/09500693.2016.1186853>
- Yusoff, M. S. B. (2019). ABC of Content Validation and Content Validity Index Calculation. *Education in Medicine Journal*, 11(2), 49–54. <https://doi.org/10.21315/eimj2019.11.2.6>