Jurnal Pijar MIPA
https://jurnalfkip.unram.ac.id/index.php/JPM

ISSN 1907-1744 (Print)
ISSN 2460-1500 (Online)

Analysis of Students Questioning Skills on Science Learning Outcomes at Junior High School

Wisnu Rizki Subiantoro*, Ratna Yulinda, Sauqina

Science Education Study Program, Lambung Mangkurat University, Banjarmasin, South Kalimantan, Indonesia
*e-mail: subiantorowisnu@gmail.com

Received: April 28, 2025. Accepted: May 26, 2025. Published: May 29, 2025

Abstract: The questioning skill ability is essential for students to promote science learning outcomes. This study aims to analyze students' questioning skills towards cognitive science learning outcomes. There are two students' questioning skills studied, namely factual questions and amazement. This study uses a quantitative descriptive method with data collection techniques through observation, learning outcome tests, and documentation. Observations of questioning skills are observed based on four group categories, namely factual, amazement, both questions and no questions. The results of the study showed that students who actively asked questions, especially factual and amazement types of questions, had higher cognitive learning outcomes than students who did not ask questions. The group of students with factual questions and asking both questions experienced a significant increase in learning outcome scores, while the group of students who did not ask questions and students who were only surprised experienced a small increase. Based on the learning outcome scores of students in the four question groups, it is important for students to ask a lot of questions in order to increase the achievement of cognitive science learning outcomes. This study indicates that students' questioning skills are related to student learning outcomes. The more active students ask questions, and the more varied the types of questions asked, the greater the increase in student learning outcomes. The many variations of questions asked by students are the key to deepening understanding. Students can improve their learning outcomes in a deeper and more meaningful learning process by asking many questions. This study reinforces the importance of the teacher's role in encouraging students to ask more questions during the learning process by providing appropriate motivation and treatment.

Keywords: Factual and Wonder; Questioning Skills; Science Learning Outcome.

Introduction

Learning does not only take place outside of school; it also takes place inside the school. Learning does not always succeed in school. Successful learning is influenced by many factors. These include learning resources that occur in the learning environment and student-teacher interactions. A good learning environment definitely involves interaction. One important component of the communication process is questioning skills [1].

Teacher-student interaction is also an important component that supports the communication process. Questioning skills are interactions that are considered important [2]. Students do not always have the ability to ask questions; sometimes, they just ask questions. Often, students face difficulties during the process of asking and answering questions in class. This can be caused by various factors, including, but not limited to, reluctance to ask questions, lack of confidence in asking questions, students' inability to understand the material, their inability to understand the process of doing assignments, students' lack of interest in the material, and lack of curiosity. In every lesson, self-confidence is very important for every student. This helps the learning process run smoothly [3].

Learning is a conscious, permanent, and behaviorally changing process. Recall of information occurs during this process, which is then stored in memory and cognitive organization. Learning is a deliberate and purposeful effort that focuses on the interests, traits, and conditions of others so that students can learn well and effectively [4]. One type of learning model, known as the inquiry learning model, emphasizes activity, skills, and knowledge through active inquiry based on curiosity. This model also helps students understand concepts and improve science process skills through scientific stages, allowing them to ask more complex questions.

Asking questions is a speaking act used to request a response from someone we know. The response we expect can be knowledge or even a view resulting from thinking. Asking is a way to express our curiosity about information that we do not yet know or that is uncertain. Many factors influence students not to ask questions. These factors can be grouped into two, namely internal factors and external factors.

Based on Kunayah's research [5], it was revealed that each of these factors is related to the others. These factors are as follows: internal factors are factors that come from the students themselves, namely student interest, influencing students' skills and ease in developing abilities in the classroom and self-confidence, inspiring themselves to do things responsibly, someone who has high self-confidence will dare to ask questions, external factors are factors that come from outside the students themselves, namely teacher motivation plays an important role in motivating students to get used to asking questions, teachers must often provide motivation to students and a

How to Cite:
W. R. Subiantoro, R. Yulinda, and S. Sauqina, "Analysis of Students Questioning Skills on Science Learning Outcomes at Junior High School", *J. Pijar.MIPA*, vol. 20, no. 3, pp. 554–558, May 2025. https://doi.org/10.29303/jpm.v20i3.8905

comfortable learning environment/atmosphere makes students more enthusiastic about learning so that students will be more confident in asking questions and expressing opinions. Research conducted by Novita [6], questioning skills are basic skills that are useful for getting information from the person we are asking. Factual questions usually only require memory and are often closed. Factual questions only push back on statements of knowledge, and they usually relate to information in textbooks or simple observations made about an event. Surprise has a strong internal effect that can encourage the questioner and the other person talking to him to think further.

This wonder, which stems from the student's hypothesis or confusion, prompts further investigation and provides an explanation of what is going on. To increase understanding of the student's confusion, students ask factual and wonder questions to gain clarification, determine hypotheses, and address their confusion.[7]. Surprise becomes a powerful potential for student confusion to advance their understanding.[8]. Questioning skills, consisting of four groups of questions, correlate with student learning outcomes during learning activities. Questioning skills are an important component in improving the learning process and outcomes.

Changes in a person's behavior and understanding, whether observable or not, are referred to as learning outcomes.[9]. Learning outcomes are achievements achieved by students in learning through exams, exercises, asking and answering questions that support the acquisition of learning outcomes. To achieve optimal learning outcomes, efforts that can be made by a teacher include using appropriate models in delivering material to students.

Learning outcomes are assessments made about students' knowledge, attitudes, and skills after they have participated in the learning process. Analysis of students' questioning skills is important for teachers so that they can provide appropriate learning assistance for their students. Teachers can improve students' ability to ask questions in the dimensions of knowledge and cognitive processes. In addition, teachers can also try to improve students' oral questioning skills, especially in aspects with low results.[10].

Based on the background of the problem that has been explained above, the formulation of the problem in this study is as follows: how is the level of questioning skills of students of SMP Negeri 6 Banjarmasin? and is there a relationship between the questioning skills of class VIII B students of SMP Negeri 6 Banjarmasin and learning outcomes?. Based on the formulation of the problem above, the objectives of this study are as follows: to determine the level of questioning skills of class VIII B students of SMP Negeri 6 Banjarmasin and to determine the relationship between the questioning skills of class VIII B students of SMP Negeri 6 Banjarmasin and learning outcomes.

Research methods

This study uses a quantitative descriptive research method, which means describing, researching, and explaining something that is studied as it is, and drawing conclusions from phenomena that can be observed using numbers. This study uses quantitative descriptive data analysis techniques. Quantitative descriptive analysis is a type of research that studies the meaning of data academically using quantitative methods and descriptive analysis techniques [11]. Quantitative data obtained during the study were collected based on field observations. Another method used in sampling is convenience sampling. Convenience sampling is sampling taken from the availability of elements and the ease of obtaining them. The sample used was class VIII B students at SMP Negeri 6 Banjarmasin in the 2024/2025 academic year, located at Jalan Veteran, Gang Sempati NO. 6, RW. 14, Melayu, Banjarmasin Tengah District, Banjarmasin City, South Kalimantan.

This research focuses on presenting information through the mean and difference/increase in research data. Descriptive statistical data analysis technique is a method used with the aim of describing sample data. This analysis technique is usually applied to research that is exploratory in nature. The data description in this study is presented in the distribution of standard deviation data. The instrument used in this study was an observation sheet instrument for questioning skills to determine the characteristics of the questioning skills of students of SMP Negeri 6 Banjarmasin based on the category of questions regarding their learning outcomes and the learning outcome test instrument was a mastery test, because this test functions to measure students' mastery of the material taught by the teacher or studied by students.

Results and Discussion

Students are divided into four groups, namely the first group of students who ask only factual questions, the second group of students who are surprised, the third group of students who ask factual and surprised questions, and the fourth group of students who do not ask. The following are the results of the validity of the instrument that has been validated by two lecturers from science education and one science teacher from SMP Negeri 6 Banjarmasin. The three validated instruments are at a very valid level.

Table 1. Validity Results

No	Validity	Score Calculation Results	Validity Level
1	Observation sheet instrument	93.05%	Very valid
2	Pretest and posttest instruments	93.33%	Very valid
3	Junior High School Science Teaching Module	92.18%	Very valid

The results of the study were obtained in four groups of questions based on the pretest and the posttest. The four groups of questions are factual questions, surprises, both questions, and not asking. Based on these data, it can be seen that there are many variations in the groups of questions asked by students before and after the implementation of the pretest and posttest.

Analysis of Learning Outcomes

The 35 students in class VIII B asked a lot of questions on average. The four groups of questions asked by the students are as follows. Factual questions show students' tendency to seek information and procedures, while questions of astonishment reflect a deeper and more critical curiosity.

The second group of questions showed more comprehensive and high-level thinking skills, while the group that did not ask questions may need further encouragement to increase their active participation in the learning process, so that students ask more questions. The analysis of this pattern is based on Table 2 of students' questioning skills. The data in Table 2 shows the distribution of the number of students and their learning outcome scores in each group of questions.

Improving Student Learning Outcomes

The research conducted by the researcher obtained results that the average pretest and posttest scores of students were grouped into four types of questions, namely, 1) factual, 2) surprise, 3) both questions and 4) not asking questions. Based on Table 2, it is known that the group of students who did not ask questions had an average pretest score of 50.00 and also an average posttest score of 58.33. This score is the lowest compared to the average scores of other student groups.

The difference in the average pretest and posttest of the group of students who did not ask questions was 8.33. This score is low because this group was not actively asking questions during science learning activities. Although this group was not actively asking questions, they still absorbed the material explained. Compared to the scores of those who asked questions during the posttest, it was only in terms of activeness in asking questions that were different from other students, this group seemed uninterested in science learning activities, which affected their skills in asking questions. According to Kunayah [5], in his research, one of the factors experienced by students is the interest in asking questions, which affects the ability and ease of students in developing cognitive skills in science lessons. Low self-confidence can make students afraid to ask questions.

They are not interested in learning in class or asking questions to the instructor. The second factor is self-confidence. They do not ask questions because they are not confident in their ability to ask questions. However, someone who is confident will dare to ask questions.[5]. In addition, it is also known that most students in the group do not ask questions in groups with students who are less successful.

This makes it difficult for them to ask questions, thus affecting their behavior and questioning skills both individually and in groups. This is in accordance with Tifaany's research.[12], differences in achievement between students within group members can also influence students' question-asking. Gil's research[13], it was found that students who did not ask questions felt unprepared to provide some answers in front of their peers and did not contribute to interactions and learning in the classroom.

The second group of questions is the group of students who ask factual questions. The average pretest score is 58.00, and the average posttest score is 72.50. The difference between the average pretest and posttest of the factual question group is 14.5. Students in this second group dare to ask questions. They are actively involved in learning by asking factual questions. Although they are not like most students in the group who ask both questions, their questions illustrate curiosity. According to Rahmayati's theory[14], students who tend to ask factual questions have a greater understanding of basic knowledge and prior knowledge compared to other students who do not ask questions. This is because they have the ability to dig up information through questions.

This can be seen from the increase in scores after the test. During the process of asking factual questions, students must reflect on the information they have received previously, elaborate, and transform the information into the latest form of information that is in accordance with the facts or references they currently have. The habit of building personal knowledge, procedures, and cognitive strategies contributes to this process [15].

The third group of questions is the group of students who asked both questions. The average pretest score was 63.81, and the average posttest score was 80.48. The difference between the average pretest and posttest of the second group of questions was 16.67. The scores of this third group have significant implications in explaining the cognitive learning process. The quality and complexity of the questions asked, in particular, are important components that influence this area. In addition to providing information about labels, facts, procedures, and causal mechanisms, the questions asked by this group also aim to provide clarification, enable hypotheses, and answer confusion experienced by students[7].

Table 2. Average Student Learning Outcomes Based on Student Questions

No.	Question	Number of Students	Average Pretest Score	Pretest standard deviation	Average Posttest Score	Posttest Standard Deviation	Difference Between Pretest and Posttest Average
1	Factual	10	58.00	7.88	72.50	7.90	14.5
2	Amazement	1	80.00	0	85.00	0	5.00
3	Both questions	21	63.81	13.21	80.48	8.64	16.67
4	No Asking	3	50.00	10.00	58.33	5.77	8.33

The group of students who asked both of these questions built knowledge, factual questions (e.g., who, what, where, and when questions), and sought information and definitions. Factual questions tend to produce fragmented pieces of knowledge, although these have the potential to serve as evidence to justify a theory. show

students' curiosity and confusion, and aim to explain or solve a problem. They are more likely to increase students' understanding of confusion[8]. For both types of questions (factual and surprise), the increase in the average score of learning outcomes was 16.67. This indicates an increase in learning outcomes.

These two questions were asked by students during the learning process, which is related to their high self-confidence, which helps them gain the ability to ask questions actively both in and out of class. Students may become more interested in the topic and learn more about it after answering these types of questions [16].

When an activity allows students to explore a phenomenon or curiosity for some time, it gives them hands-on experience, which makes students more interested in asking questions. However, teachers should pay attention to students' focus and exploration when asking questions. Questions and answers can be used by teachers as a reference when they see how students learn [17].

The fourth group of questions is the surprise group. The average pretest score is 80.00, and the average posttest score is 85.00. The difference between the average pretest and posttest of the surprise group is 5.00. The surprise questions asked by students indicate that the students are creative, because the surprise questions involve more complex ideas. One student who asked this surprise question showed an abstract interest, such as creating new topics and expressing opinions. Student surprise is very important for learning, education, and creativity [7].

Students who are self-motivated to learn new things use more sophisticated and complex methods used by students to encourage them to try new things. One of these students is more likely to create higher-quality questions because they observe the process of understanding metacognitively. Students enthusiastically seek answers to their questions when they see and learn with curiosity. Such questions provoke their own minds to earnestly seek answers to questions[18].

One student who asked a question was surprised by a good score on his pretest and posttest. This is different from most students, who did not ask questions. This student has a high curiosity and critical thinking. This student not only masters the material cognitively but also has high-level thinking skills. Overall, through research conducted by researchers, the learning outcomes of these students show a combination of good academic achievement and active questioning and learning skills. Students' questioning skills have been proven in this study. So there are many variations of questions asked by students.

The many variations of these questions can be used as evaluation material for teachers in teaching, so that students are more active in asking questions. Students who ask questions will learn more than those who do not ask questions. Some factors that cause students not to ask questions are students' interest in learning science, self-confidence, motivation from teachers and the learning environment/atmosphere [5], science subjects are considered capable of producing quality students.

It is important for teachers to dig deeper into the various types of questions asked by students in order to assess the students' learning process. Teachers are not only responsible for teaching, but also for observing the process of students asking questions. So that students will ask more questions and experience more learning processes, be it factual questions, surprises, both questions or those who do not ask questions. After observing their students in class, teachers are also responsible for providing appropriate treatment for the findings of these questioning skills.

It is important for teachers to motivate students. This is so that they get used to asking questions; besides that, uncomfortable learning environment factors can also make it difficult for them to ask questions, such as uncomfortable, dirty or hot classrooms. Students can be more motivated to learn if they have a comfortable learning environment or atmosphere. As a result, students will be more courageous in asking questions and expressing opinions [5].

The variety of questions asked by students is key to deepening understanding. When students only listen to information, they are prone to forgetting due to the lack of active involvement. The deepest understanding occurs when students are truly directly involved, doing activities related to the subject matter, whether it is asking questions and so on.

As a form of direct involvement in the learning process, asking questions is the key to deepening students' understanding and learning outcomes [19]. Science subjects are considered to be able to produce high-quality students because they teach students skills for scientific thinking, one of which is the ability to ask questions [20].

The skill of asking questions is very important to improve student learning outcomes. Students who are skilled at asking questions have a good sense of curiosity compared to students who do not ask questions. Questioning skills can also improve students' understanding of science learning.

Conclusion

Based on the results and discussion of the analysis of students' questioning skills towards cognitive science learning outcomes, it can be concluded that: There are four groups of students with diverse questioning skills, namely question groups 1) factual, 2) amazement, 3) factual, amazement and 4) not asking. Students' questioning skills are related to student learning outcomes. The more active students are in asking questions and the more varied the types of questions asked, the greater the increase in student learning outcomes.

Author Contributions

Wisnu Rizki Subiantoro: conducted the research, collected and analyzed the data, and wrote the article manuscript. Ratna Yulinda and Sauqina: provided guidance, direction, and critical review of the article manuscript as supervisors during the research process.

Acknowledgement

The researcher would like to thank the principal, teachers, students of SMP Negeri 6 Banjarmasin, and our lecturers for their support and cooperation in completing this research.

Reference

[1] M. Yulia, “Keterampilan Bertanya dengan Pembelajaran PQ4R (Preview , Question , Read ,

Reflect , Recite dan Review)," *Jurnal Riset Madrasah Ibtidaiyah (JURMIA)*, vol. 2, no. 2, pp. 258–265, https://doi.org/10.32665/jurmia.v2i1.514

[2] S. Mansur, "Penerapan Metode Inkuiri Terbimbing Terhadap Keterampilan Proses Sains dan Hasil Belajar Siswa SMP," *Jurnal Pendidikan Dan Pembelajaran Biologi*, vol. 5, no. 2, pp. 140–146, 2021, https://doi.org/10.33369/diklabio.5.2.140-146

[3] T. A. Ariana, "Peningkatan Percaya Diri Melalui Model Pembelajaran Think Pair Share pada Siswa Sekolah Minggu Buddhis di Banyuwangi," *jurnnal pencerahan*, vol. 13, pp. 44–54, 2020, DOI:10.58762/jupen.v13i2.54

[4] A. Thobroni, M., belajar dan pembelajaran. Jogyakarta: Ar-Ruzz Media, 2015.

[5] H. N. . Kunayah, d., "Analisis Kemampuan Bertanya Siswa Ditinjau dari Efikasi Diri", *Jurnal Tadris IPA Indonesia* , vol. 3, no. 3, pp. 228–237, 2023, https://doi.org/10.21154/jtii.v3i3.2500

[6] A. N. Waruwu and Z. Almsy, "Keterampilan Bertanya dalam Proses Pembelajaran di Kelas," *Jurnal Kajian Ilmu Pendidikan*, no. 20, pp. 65–71, 2023, https://doi.org/10.24114/paedagogi.v9i1.44757

[7] S. Luchini, T. Raz, and R. Beaty, "Automated Scoring of Open-Ended Question Complexity : A Large Language Model Approach," *Research Square*, pp. 1–25, 2024, https://doi.org/10.21203/rs.3.rs-3890828/v1

[8] G. Zhu and C. M. Resendes, "Student-Generated Questions Fostering Sustainable and Productive Knowledge Building Discourse Questions générées par les élèves Favoriser un discours sur le renforcement des connaissances durables et productifs," *Canadian Journal of Learning and Technology*, vol. 48, no. 2, 2022, DOI: https://doi.org/10.21432/cjlt27978

[9] Y. Sinyo and I. Majid, "Peningkatan Hasil Belajar Siswa SMA Negeri 3 Halmahera Selatan Pada Materi Keseimbangan Lingkungan Melalui Penerapan Model Pembelajaran Problem Based Learning,"*journal Edukasi*, vol. 21, no. 3, pp. 644–654, 2023, https://doi.org/10.33387/j.edu.v21i2

[10] M. Pasaribu, A. Fernando, N. Eka, and K. Hindrasti, Kemampuan bertanya siswa pada model pembelajaran discovery learning materi animalia kelas x,"*Bio-Pedagogi : Jurnal Pembelajaran Biologi*, vol. 11, no. 2, pp. 99–109, 2022, https://dx.doi.org/10.20961/bio-pedagogi.v11i2.64459

[11] Alfatih, *Panduan Praktis Penelitian Deskriptif Kuantitatif.* Palembang: UPT Unsri Press., 2022.

[12] T. Grace and K. Grieger, " Characterizing students' peer–peer questions: frequency, nature, responses and learning, *Chemistry Education Research and Practice.*, vol. 24, pp. 852–867, 2023, DOI: https://doi.org/10.1039/D2RP00146B

[13] J. G. Llinás, "An Educational Method Based on Student-Generated Questions," *International Journal of Educational Methodology*, vol. 9, no. 2, pp. 333–343, 2023, Research Article https://doi.org/10.12973/ijem.9.2.333

[14] D. Rahmayanti, "Pengaruh keaktifan bertanya siswa terhadap hasil belajar siswa sekolah dasar," *holistika Jurnal Ilmu PGSD*, pp. 34–40, 2022, DOI: 10.24853/holistika.6.1.34-40

[15] S. Mao, D. Wang, C. Tang, and P. Dong, "Students ' Online Information Searching Strategies and Their Creative Question Generation : The Moderating Effect of Their Need for Cognitive Closure," *Frontiers in Psychology.*, vol. 13, no. May, pp. 1–9, 2022, doi: 10.3389/fpsyg.2022.877061.

[16] M. Zahranie, Y. Andayani, and I. N. Loka, "Hubungan Keaktifan Bertanya Dengan Kecenderungan Berpikir Kritis Siswa Kelas Xi Ipa Di Sma / Ma Se-Kecamatan, *jurnal fkip unram*, 3 (1) 2020, https://doi.org/10.29303/cep.v3i1.1426

[17] I. Skalstad and E. Munkebye, "Young children ' s questions about science topics when situated in a natural outdoor environment : a qualitative study from kindergarten and primary school," *International Journal of Science Education*, vol. 43, pp. 1017–1035, 2021, https://doi.org/10.1080/09500693.2021.1895451

[18] L. Maplethorpe, H. Kim, M. R. Hunte, M. Vincett, and E. E. Jang, "Student-Generated Questions in Literacy Education and Assessment," *Journal of Literacy Research*, vol. 54, pp. 74–97, 2022, https://doi.org/10.1177/1086296X221076436

[19] Betu, "Pentingnya Keterampilan Bertanya Peserta Didik : Kompetensi Penting Dalam Kurikulum Merdeka," *Jurnal Pastoral dan Kateketik*, vol. VIII, no. 2, pp. 1–16, 2024, doi: 10.53949/arjpk.v8i2.13.

[20] J. Muhaling *et al.*, "Pengaruh Tanggung Jawab Terhadap Sikap Siswa pada Mata Pelajaran," *Journal Evaluation in Education*, vol. 1, no. 4, pp. 149–155, 2020, https://doi.org/10.37251/jee.v1i4.162