

Optimizing Students' Questioning Skills in Wave Topics through Problem-Based Learning and the SETS Approach

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Article Info	Abstract
Article history: Received: October 6, 2024 Accepted: March 5, 2025 Published: May 2, 2025 Keywords: Questioning skills Problem-based learning Waves SETS This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License © 2025 Berkala ilmiah Pendidikan Fisika	This study aims to analyze the quantity and quality of students' questioning skills and their challenges when asking questions in class. This study uses a qualitative approach with a problem-based learning (PBL) model combined with the SETS (Science, Environment, Technology, and Society) approach, focusing on wave material. Data were collected from 22 students of grade XI.4 at a senior high school in Sumedang Regency, West Java. The quality of questions was measured based on the Revised Bloom's Taxonomy. The results showed that this method successfully encouraged student participation, with the number of students asking questions increasing from only one student to 12 students, with 30 questions over three meetings. However, 60% of the questions were still at a low cognitive level, while 40% had reached a higher level. This indicates that there is an increase in asking more in-depth questions. However, challenges in the classroom still arise, and many students are reluctant to ask questions because they fear being viewed negatively. This hinders their active participation. To overcome this, teachers must create a safe and supportive classroom environment so students feel comfortable asking questions without fear. Consistent guidance, motivation, and appropriate variations in learning methods/models are essential to increasing the quantity and quality of student questions.
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INTRODUCTION

Learning activities must be designed to foster an interactive, engaging, and challenging learning environment that motivates students to participate actively. Teachers play a crucial role in facilitating learning activities that promote interactions between students and teachers and among students themselves ([Ika et al., 2019](#); [Isradini et al., 2020](#); [Zulfatunnisa, 2022](#)). Effective communication is essential in supporting these interactions, and one key communication skill in the learning process is questioning. Questioning skills encourage students to explore problems more deeply and allow teachers to assess students' conceptual understanding ([Cahyani et al., 2015](#); [Kalsum et al., 2022](#); [Rosidah, 2019](#); [Yip, 2004](#)).

A strong conceptual understanding enables students to grasp the material more comprehensively, directly influencing their learning outcomes. According to research conducted by [Septina et al., \(2014\)](#), low student learning outcomes are caused by learning methods centered on lectures, where teachers are more dominant in delivering class material, while students tend to be passive. This often makes students feel bored, as seen by the lack of participation, such as rarely asking or answering questions; some students even appeared sleepy throughout the learning session. The researcher concluded that

students who actively ask questions demonstrate a higher level of engagement throughout the learning session.

The study by [Royani and Muslim \(2014\)](#) stated that when students ask questions, it will indirectly show their mindset. Asking questions can also encourage students' thinking skills. Questions are a stimulus that encourages students to think and learn ([Asikin, 2020](#); [Pasaribu et al., 2023](#); [Yulia, 2022](#)). Asking questions is included in the basic skills in learning and social interaction ([Hughes & Marhatta, 2023](#)). However, in class, like in the research conducted by Yulia, students prefer to answer rather than ask questions. There are two purposes for using questions in the learning process. Namely, questions are used as an assessment tool ([Earl, 2012](#); [Guarrella et al., 2023](#)) to help students think and reason ([Dillon, 1982](#); [Nina, 2014](#); [Wilten, 1987](#)).

According to [Berkowitz \(2003\)](#), the ideal question involves intellectually seeking information and causes them to think. This statement refers to the expectations for enhancing the caliber of inquiries posed by learners. According to [Harlen & Qualter \(2004\)](#), the skills involved in questioning can be evaluated by analyzing the kinds of questions students ask. One approach to assessing students' questioning abilities is to observe the quality and number of questions they pose. The quality of these inquiries can be assessed using the Revised Bloom's Taxonomy, namely low cognitive level questions, namely questions asked by students are at the cognitive level of memorizing, understanding, and applying, while high cognitive level questions include questions at the level of analyzing, evaluating, and creating ([Anderson et al., 2000](#); [Yip, 2004](#)). Another measure of questioning skills is the number of questions posed. The number of questions refers to the overall count of inquiries students make throughout the learning process. The more frequently students pose questions, the more engaged they are in participating in the learning activities ([Ika et al., 2019](#)).

Based on a preliminary study involving observations and interviews with 11th-grade teachers, students were allowed to ask questions during lessons. However, the number and scope of questions were limited to only a few students. Records from four meetings indicated that only one student asked a question in class. This issue is particularly concerning, especially since most physics lessons occur between 11:30 AM and 3:00 PM, when students' physical condition and concentration tend to decline. This phenomenon suggests that the learning approach used in the classroom does not sufficiently encourage active interaction between students and teachers. The primary hypothesis is that direct instruction methods, such as lectures, predominantly limit students' engagement. This is supported by research conducted by [Kalsum et al. \(2022\)](#), which analyzed students' questioning skills in elementary school science learning. Their findings revealed that teachers primarily used lecture and discussion methods, which hindered students' ability to develop their questioning skills actively. Among the 33 students studied, only eight occasionally asked questions when necessary, while the remaining 25 never asked.

Further analysis indicates that the main barriers preventing students from asking questions include shyness, fear of being ridiculed by peers, and a lack of confidence in addressing teachers directly. Additionally, the evaluation results suggest that teachers' reinforcement of students' questioning skills remains suboptimal. Moreover, students' curiosity about the subject matter is relatively low. Among the 33 students observed, only 15 were highly curious about the taught topics. At the same time, 18 showed little to no interest in further exploring the lessons presented by their teacher. Sixth-grade students demonstrated lower questioning skills than other grade levels, as they tended to remain silent and passively listen during lessons. This issue highlights a systemic educational challenge, where students lack sufficient opportunities or support to develop independent questioning skills.

Several studies analyzing students' questioning skills suggest that the Problem-Based Learning (PBL) model has the potential to address this issue. A study conducted by

[Susilowati \(2019\)](#) implemented PBL in Indonesian language learning at SDN Salatiga 02, demonstrating a significant improvement in students' questioning skills. The data showed that after applying PBL, the number of students raising their hands increased by 64%, written questions increased by 57%, peer-to-peer questioning increased by 47%, and group questioning skills improved by 34%.

A similar trend was reported in a study by [Ika et al. \(2019\)](#), which analyzed students' questioning skills in science learning on Temperature and Heat at SMP Negeri 2 Jember. Their findings revealed that 35.48% of students asked questions, but the cognitive level of their questions remained low. Notably, no questions were classified as high-order thinking questions. These findings suggest that while PBL enhances students' questioning skills, a more structured approach is needed to ensure that students ask more questions and improve their quality, promoting higher cognitive engagement.

In this context, other research has also shown that PBL not only increases the number of questions students ask but also helps them process relevant information more effectively, build knowledge, and reach more accurate conclusions ([Hidayatullah & Setiawan, 2024](#)). These studies found that students who learned through PBL were better able to connect previously learned concepts, giving them greater confidence in developing deeper, more reflective, and analytical questions. Furthermore, PBL encourages students to structure and organize information effectively, which helps them develop stronger arguments and insights, unlike traditional learning methods, focusing more on rote memorization.

The PBL model effectively motivates students to ask questions, placing them in real-world problem-solving situations ([Dewey, 1910](#); [Piaget, 1954](#); [Shishigu et al., 2018](#); [Tan, 2003](#); [Yulianti & Sahidu, 2020](#)). This approach aligns with constructivist learning theory, suggesting that students learn more meaningfully when constructing their understanding. Within the PBL framework, teachers shift from being knowledge transmitters to facilitators who guide students in analyzing and describing problems, developing learning strategies, conducting individual and group investigations, presenting findings, and evaluating their problem-solving processes ([Arends, 2015](#); [Hmelo-Silver, 2004](#); [Navy et al., 2019](#); [Zwaal, 2019](#)). As a result, implementing PBL not only enhances the quantity of student questioning but also improves the quality of their inquiries, encouraging deeper, more analytical, and reflective questioning.

A review of various studies suggests that low student questioning skills can be attributed to several key factors, including the dominance of lecture-based teaching methods, insufficient teacher reinforcement, psychological barriers such as shyness and fear of peer criticism, and a general lack of curiosity about learning materials. Implementing PBL presents a promising solution to address these challenges. However, to optimize PBL, certain strategies should be incorporated, such as structured questioning techniques like Scaffolding or Socratic Questioning. Additionally, teachers must take on a more active role as facilitators, delivering content and guiding students in developing their questioning skills. Regular assessments of students' questioning development should also be conducted, allowing teachers to adjust their teaching strategies accordingly. With proper implementation, PBL can increase both the quantity and quality of students' questions, enabling them to think more critically and analytically in their learning process.

For this reason, the researchers combined the PBL model with the SETS approach, emphasizing these four areas' interconnectedness. The primary focus of learning using the SETS approach is to engage students in investigations that help them acquire knowledge across science, environment, technology, and society. By linking learning content to real-life situations and contexts (contextual learning), the effectiveness of the learning process can be significantly enhanced ([Binadja, 1999](#); [Hardianti et al., 2020](#); [Ningtyas et al., 2014](#); [Rosario, 2009](#); [Yuniastuti, 2015](#)).

For this reason, the researchers combined the PBL model with the SETS approach, which emphasizes the interconnectedness of these four areas. The primary focus of learning

using the SETS approach is to engage students in investigations that help them acquire knowledge across science, environment, technology, and society. While previous studies have shown that contextual learning can increase the effectiveness of teaching ([Binadja, 1999](#); [Hardianti et al., 2020](#); [Ningtyas et al., 2014](#); [Rosario, 2009](#); [Yuniastuti, 2015](#)), there is still a lack of research on how PBL combined with the SETS approach can enhance students' questioning skills, particularly in understanding and analyzing scientific phenomena. Specifically, while PBL has been shown to improve students' engagement and critical thinking, its role in boosting the quality and depth of student questions within science subjects like physics has not been thoroughly explored.

In this study, students would explore wave phenomena through videos depicting natural occurrences. This method aims to raise students' awareness of the importance of protecting the environment, and it is hoped that students will develop a deeper appreciation for nature and may even engage in actions to minimize environmental damage ([Sujarwo, 2016](#)). However, few studies have addressed how this context-based learning influences students' ability to ask meaningful, high-level questions. When students see the relevance of wave concepts to real-life situations, their curiosity will increase, and they will begin to ask more critical and insightful questions. Therefore, this study aims to assess the quantity and quality of students' questioning skills, categorize their questions based on Revised Bloom's Taxonomy, evaluate the quality of their questions at each meeting, and identify any obstacles students encounter when asking questions.

METHODS

This study employs a qualitative descriptive research design, which aims to describe in real or actual terms the conditions of the students being studied ([Ajat, 2018](#); [Sartika et al., 2021](#)). This approach allows the researcher to understand the students more deeply by collecting data that reflects their experiences, behaviors, or conditions.

In this study, the researchers used a combination of observations of 11th-grade students, interviews with teachers and students, and digital data analysis using Google Forms to collect information. The goal is to describe the significant relationships among the students in a natural context. The collected data was then analyzed to identify patterns and key relationships between the studied variables. This qualitative approach allows the researchers to better understand the subjects' experiences and the contextual factors influencing their actions and responses ([Adiputra, 2022](#)). Using this approach, the study aims to clarify the picture of the students and provide an in-depth narrative about their questioning skills.

This research was conducted in class XI MIPA, with a sample of 22 students from XI MIPA 4 at a Senior High School in Sumedang Regency, West Java. The sample selection was conducted using a purposive sampling technique, which involves selecting samples based on specific considerations ([Diani et al., 2016](#)) aligned with the study's objectives.

Data collection techniques used were teacher interviews, student questionnaires in Google Forms, drawing sheets, and discussion question quality sheets. The quality of questions was measured based on Bloom's Taxonomy Critical Thinking Cue Questions adapted by [Allen \(2013\)](#) from Public Consulting Group's Center for Resource Management, in partnership with the Council of Chief State School Officers, August 2007 in Table 3 and the Learning, Teaching and Assessment Book by Lorin W. Anderson and David R. Krathwohl. The researcher provided a student questionnaire in the form of Google Forms, as shown in Table 1.

Table 1 Student questionnaire

No.	Question	Answer
1	During the discussion of the breakwater "tool/idea" presentation, did you ask any questions?	Yes No

No.	Question	Answer
2	If yes, why do you want to ask? (You can choose more than one answer)	Curious about Testing other groups. There is disagreement with the other group's ideas. Seeking added value
3	If not, why didn't you ask?	Open-ended question
4	Yes and No. What kind of things do you think your friends say that indirectly tell you not to ask questions during a presentation?	Open-ended question

Meanwhile, the researchers utilized the format presented in Table 2 to categorize all student questions during the learning process using the PBL model with the SETS approach.

Table 2 Student question quality

Cognitive Dimension		Total	Percentage (%)
Low-Level Cognitive	Remembering (C1)		
	Understanding (C2)		
	Applying (C3)		
Higher Level Cognitive	Analyzing (C4)		
	Evaluating (C5)		
	Creating (C6)		
Number of Questions			

To categorize the quality of questions submitted by students in learning, we used Bloom's Revised Taxonomy.

Data analysis focused on answering the research questions: 'How to analyze the quantity and quality of students' questioning skills, classify students' questions according to Bloom's Revised Taxonomy, assess the quality of students' questioning skills at each meeting, and describe students' obstacles in asking questions.' As outlined in the research procedure, the teacher analyzed the questions posed by other groups. After calculating the number of questions, the researchers assessed the quantity and quality based on Bloom's Revised Taxonomy. Additionally, the researchers analyzed the quality of these questions at each meeting to enable the teacher to assess students' questioning skills in more detail. The researcher also described any obstacles students face during the learning process that make them reluctant to ask questions.

To determine the increase in the number of students asking questions and the total number of questions asked, the formula from [Yanto & Zubair \(2022\)](#) can be applied

A = To calculate the increase in the number of students asking questions (%)

$$A (\%) = \frac{N_1 - N_0}{N_0} \times 100\% \quad (1)$$

B = To calculate the number of students who ask questions (%) in one class

$$B (\%) = \frac{N_1}{N} \times 100\% \quad (2)$$

Where:

N_0 = Number of students who asked questions at the beginning

N_1 = Number of students who asked questions at the moment

N = Number of students in a class

This research was conducted from February to March 2024. The research procedure consists of 2 activities. The initial activity of the researcher was to create a Lesson Implementation Plan for PBL with the SETS approach for wave material and create a presentation containing directions and learning activity flow. The next activity is implementation. In the implementation activity, students were given a video of problems related to the negative impacts of waves on the coast (sea abrasion) (Problem Orientation). Then, students sat in groups to discuss (Organizing students to learn). The teacher asked each group to describe and develop a solution to the problem by designing a wavebreaker to safeguard the community.

The teacher-guided individual and group investigations. Each group must determine the type of wave first before determining the solution (Developing Solutions). Students are encouraged to gather information from various sources, including news articles and other research, to assist in designing wave breaker solutions. After that, students drew on paper provided by the teacher. Each group was allowed to present solutions and analyze and evaluate the problem-solving process from various questions and comments from other groups.

The teacher analyzed the questions posed by other groups. Based on the Revised Bloom's Taxonomy, the quantity and quality of the questions were then assessed for each student who asked them.

Researchers carried out data collection in the form of questions in a question-and-answer session after students had given their presentations.

The flow of this research is outlined in Figure 1.

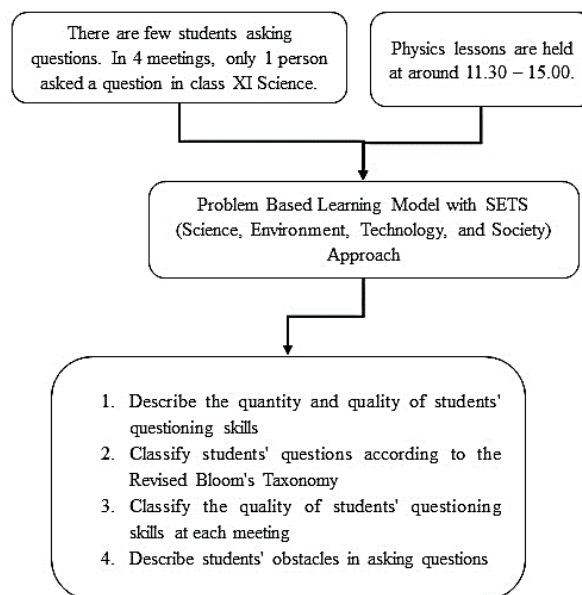


Figure 1 The flow of this research

RESULTS AND DISCUSSION

The students asked questions for several reasons, as listed in Figure 2.



Figure 2 Reasons students ask questions

Several factors cause students to be reluctant to ask questions, as explained in Figure 3.

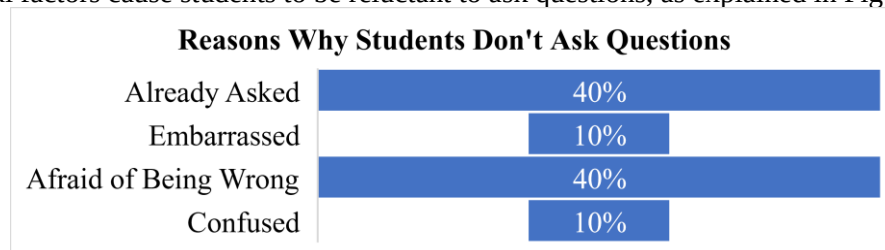


Figure 3 Reasons why students don't ask questions

The results of the quality of students' questions are shown in Table 3.

Table 3 Student question quality

Cognitive Dimension		Total	Percentage (%)
Low Level Cognitive	Remembering (C1)	10	60%
	Understanding (C2)	5	
	Applying (C3)	3	
Higher Level Cognitive	Analysing (C4)	9	40%
	Evaluating (C5)	2	
	Creating (C6)	1	
Number of Questions		30	100%

The results of the classification of question quality based on meetings are shown in Table 4.

Table 4 Classification of question quality based on meeting

No.	Students	Meeting		
		1st	2nd	3rd
1.	A	C1		C1 C1 C1
2.	B		C2 C4 C1	C2
3.	C			C3
4.	D			C1
5.	E		C5 C4 C1	C3 C1 C1
6.	F			C4
7.	G		C1	
8.	H		C4 C6	
9.	I	C4 C2	C4 C4 C2 C4	C5
10.	J		C2	
11.	K		C4	
12.	L	C3		
Total	12 people	4	15	11

The learning process is conducted by adhering to the stages of the Problem-Based Learning model, which include orienting students to the problem, facilitating their learning, guiding both individual and group investigations, developing and presenting the outcomes of their work results and analyzing and evaluating the problem-solving process using the SETS approach. In addition, there is also the provision of motivation and rewards, namely the addition of active values.

Analysis of the Number of Student Questions

In class XI.4, there has been a 92% increase in the number of students asking questions, rising from just one student to 12, with 30 opportunities to ask questions. Students are

increasingly confident in asking questions, so in 3 meetings, there are 30 questions raised by students. Class XI.4 consists of 22 students in total. This means that 55% of students asked questions during the learning activity. Although around 45% of students still have not asked questions, this is a very good start for teachers for future physics learning. This certainly shows increasing results, where students become more confident in expressing their opinions through questions to other groups doing presentations.

Reasons Students Ask Questions

In addition to measuring the quantity of student questions, researchers also took data using a questionnaire in the form of a questionnaire. It was found that the total number of students asking questions during Problem-Based Learning with the SETS approach was 12. The students asked questions for several reasons, as listed in Figure 2. Initially, the researcher thought that most students who asked questions were looking for added value. Still, after seeing these results, the researcher realized that other factors influenced this. Four things are different in this study compared to the previous class, namely the form of learning that examines the environment with the SETS approach, motivation, class conditioning, and rewards or added value so that students are interested in asking questions. This motivation increases students' interest in learning, making them happy and serious about learning without being asked/told ([Andriani & Rasto, 2019](#); [Yunitasari & Hanifah, 2020](#)).

According to the image above, it is evident that 83.33% of students asked questions due to their curiosity to learn more about what was presented by other groups. In addition, 58.33% of students asked to get added value from the teacher, 41.67% asked because they disagreed with the idea of the group presenting, and 41.67% asked to test other groups. This aligns with research that indicates that providing added value can motivate students to ask questions ([Nurbawani, 2022](#); [Sofwan, 2016](#)), as evidenced by the number of students who asked questions reached 58.33%. The researcher concluded that students' curiosity is the main factor that triggers various questions, ranging from low to high cognitive levels.

Reasons Why Students Don't Ask Questions

Several factors contribute to students' reluctance to ask questions, as illustrated in Figure 3. The figure shows that 40% of students refrained from asking questions because they felt their peers had already raised the same concerns. Another 40% feared asking the wrong question or phrasing their inquiry incorrectly, while 10% felt embarrassed. The remaining 10% were unsure of what to ask as they did not understand the material presented by other groups. Additionally, some students found it difficult to start asking questions, particularly when unsure how to begin ([Cahyani, 2016](#); [Kurniawati et al., 2021](#)).

However, these obstacles go beyond mere surface-level concerns. The fear of asking the "wrong" question or making a mistake often undermines students' confidence, preventing them from participating actively. As a result, students tend to disengage from the learning process, which limits their critical thinking development and hinders their ability to engage more deeply with the material. Furthermore, comments or non-verbal cues from peers during presentations or discussions may further discourage students from asking questions, creating an environment in which questioning is indirectly discouraged.

This condition is also the same as in the study conducted by [Kalsum et al. \(2022\)](#), where 25 out of 33 students never asked questions. This was due to embarrassment and fear of being teased by their classmates. This situation affects their learning and interferes with their personal and social lives in school and within their community. Indirectly, it makes them feel less safe, reluctant to develop, hesitant, and vulnerable to various negative effects ([Maulidiya, 2023](#)).

Some common comments made by peers, which unintentionally deter students from asking questions, include: "So clever," "Hadeuh, what pretentious tsq?", "Don't ask too many questions," "You already understand it, don't ask," or "If you ask, I'll ask harder

questions when you present." These comments add psychological pressure on students who may want to ask questions, leading to a lack of confidence and hesitation to participate. In some cases, students also face remarks like "You're so smart, no need to ask, right?" or "It's already been explained, aren't you listening?" which further discourages them. This social dynamic and personal concerns result in a reluctance to ask questions, ultimately affecting their learning outcomes.

Additionally, the fear of being judged for asking "simple" or "irrelevant" questions often causes students to hesitate in expressing their doubts, especially in a classroom environment where peer perceptions carry significant weight. These barriers point to a broader issue: a learning environment that inadvertently suppresses curiosity and active participation, both of which are critical components of effective learning.

Classification of Questions According to Bloom's Taxonomy, Critical Thinking Cue Questions

This is based on the Critical Thinking Cue Questions from Bloom's Taxonomy Table, adapted by C. Allen, and insight from the book "Learning, Teaching and Assessment" by Lorin W. Anderson and David R. Krathwohl. The researcher classified students' questions into the following table. Furthermore, the quality of students' questions is classified into low and high cognitive levels. Based on the data in Table 3, the quality of questions of students in class XI.4 in the cognitive dimension of remembering amounted to 10, in the cognitive dimension of understanding amounted to 5, and in the cognitive dimension of applying amounted to 3. The data obtained reported that 60% of the students' questions were in the category of low cognitive level. Questions on the cognitive dimension of analyzing amounted to 9, on the cognitive dimension of evaluating amounted to 2, and on the cognitive dimension of creating amounted to 1. The data obtained reported that 40% of the student's questions were in the category of high cognitive level. Based on Table 4, it can be seen that student "A" asked a total of 4 questions, with details of 1 question at the first meeting and three questions at the third meeting. If classified according to Bloom's Revised Taxonomy, these four questions belong to the low cognitive level of C1 (remembering). In the second meeting, student "A" did not ask any questions.

Student "B" asked a total of 4 questions. In the second meeting, student "B" asked 3 questions with the classification of C1 (remembering) and C2 (understanding), which included a low cognitive level, and then C4 (analyzing), which included a high cognitive level. In the third meeting, student "B" asked 1 question with a low cognitive level of C2 (understanding). In the first meeting, student "B" did not ask questions.

In the third meeting, students "C, D, and F" only asked 1 question. If classified according to Bloom's Revised Taxonomy, the question asked by student "C" with the classification of C3 (applying) and the question asked by student "D" with the classification of C1 (remembering) both include low cognitive levels. Then, the question student "F" asked with classification C4 (analysis) included a high cognitive level. While in the first and second meetings, students "C, D, and F" did not ask questions.

Student "E" asked a total of 6 questions. In contrast, in the second meeting, student "E" asked three questions with classification C1 (remembering), which includes a low cognitive level, then C4 (analyzing), and C5 (evaluating), which includes a high cognitive level. In the third meeting, student "E" asked two questions with a low cognitive level C1 (remembering) and 1 question C3 (applying). In the first meeting, student "B" did not ask questions.

Students "G, J, and K" only asked 1 question in the second meeting, while in the first and third meetings, they did not ask questions. If classified according to Bloom's Revised Taxonomy, the questions asked by student "G" with classification C1 (remembering) and the questions asked by student "J" with classification C2 (understanding) both belong to a

low cognitive level. Whereas the questions asked by student "K," who entered the classification of C4 (analyzing), included a high cognitive level.

Meanwhile, student "H" asked a total of 2 questions in the second meeting, while he did not ask questions in the first and third meetings. If classified according to Bloom's Revised Taxonomy, the questions asked by student "H" included high cognitive levels, namely C4 (analyzing) and C6 (creating).

Student "I" asked a total of 7 questions, whereas in the first meeting, student "I" asked 1 question with C2 classification (understanding), which included a low cognitive level, and 1 question with C4 classification (analyzing), which included a high cognitive level. In the second meeting, student "I" asked three questions, C4 (analyze), which included a high cognitive level, and asked 1 question with C2 classification (understand), which included a low cognitive level. In the third meeting, student "I" asked 1 question with a high cognitive level, C5 (evaluate).

Student "L" only asked 1 question in the first meeting, while the second and third meetings did not ask questions. If classified according to Bloom's Revised Taxonomy, the questions student "L" asked included a low cognitive level, namely C3 (applying).

Based on this, it can be said that students' "I", in addition to asking the most, namely seven questions, quality of the questions asked by a student "I," namely 5 out of 7, are high cognitive level questions. These high cognitive-level questions lead to deep conceptual changes ([Malleus et al., 2024](#); [Yip, 2004](#)).

On the other hand, from the three classes, the number of questions is still dominated by low cognitive level quality questions, but this progress is positive. This can certainly be caused by learning that does not train students' questioning skills, starting from direct instruction learning, and others. In addition, students' understanding of the material is likely still low, so students cannot ask questions with high cognitive levels. This questioning skill can also be improved by habituating questions and answers during teaching and learning activities in the classroom. So, with habituation, the possibility of students asking questions is greater. When the habit grows, the learning activities will be more active ([Yanto & Zubair, 2022](#)). Especially in learning that emphasizes the PBL model with the SETS approach, where students develop knowledge and effective learning from abstract concepts in challenging subjects like wave theory ([Aflalo & Raviv, 2022](#); [Fatchan et al., 2014](#); [Yuniastuti, 2015](#)). [Chin & Brown \(2002\)](#) concluded that in activities, students tend to generate more in-depth and varied questions, indicating they are more likely to think critically and exploratively when faced with problems to solve independently, as shown by the 30 questions raised by students.

When examined based on the quantity and quality of questions students ask, the barriers they face show that some students have overcome these obstacles. However, many students who want to ask questions are hindered by assumptions and remarks from their peers. Therefore, teachers must create a safe space in the classroom where students can speak freely without fear of being judged. One way to do this is by getting students accustomed to asking questions at the beginning of lessons, especially in learning that integrates the PBL model with the SETS approach.

The PBL model focuses on solving real-world problems relevant to everyday life, allowing students to formulate more critical and in-depth questions. In PBL, students are confronted with issues that require further investigation, encouraging them to ask questions about more complex topics and analyze various aspects of the problem. The SETS approach, which links science, technology, environment, and society, enriches the context of the questions students ask, allowing them to pose questions that not only focus on academic aspects but also social and environmental issues relevant to their lives. Therefore, learning based on PBL + SETS will encourage students to ask high-quality questions and reflect critically and reflectively.

This habituation can be carried out through a supportive and motivating approach so students feel comfortable and confident in asking questions. In addition, applying the SETS approach allows students to see the interconnection between science, technology, environment, and society, which can stimulate their curiosity to ask more and deeper questions. Teachers also need to provide positive feedback every time a student asks a question so that the student feels valued and not afraid to ask more. In this way, students can build their confidence in asking questions, increasing their engagement in learning, and improving overall learning outcomes. Furthermore, this real-world contextual learning can lead students to ask more relevant questions with greater depth of thought and be oriented toward solving more complex problems.

CONCLUSION

Based on the research that has been conducted, it is seen that the Problem-Based Learning model with the SETS (Science, Environment, Technology, and Society) approach has been proven to encourage students to be more active in asking questions. This can be seen from the significant increase in the number of students asking questions, from only one student to 12. Although 60% of the questions asked were still classified as low cognitive level, it was noted that 40% of students had asked questions in the high cognitive level category. This shows that some students are starting to ask deeper questions and can hone their friends' thinking skills. This development is very good for the future. Therefore, teachers need to provide guidance, motivation, learning variations, and added value so that students continue to actively ask questions and improve the quality of their questions during activities in the classroom.

CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS STATEMENT

AS: academic supervisor and reviewer of this research manuscript, IRS: providing direction and guidance in perfecting this research assignment. DYSA: Conceptual, method, data collection, data analysis, draft manuscript.

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