



## Analysis of students' question types in biology learning using problem based learning integrated with 'questions-students-have' strategy



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### ABSTRACT

Students' thinking abilities can be identified through the questions they ask during the learning process. This study aims to analyze the types of students' questions with the Problem Based Learning model integrated with 'Questions-Students-Have' (QSH) strategy. This study was conducted at SMAN Tangerang Year XI MIA 3. The research method used was descriptive research. Sampling was in the form of non-probability sampling with purposive sampling technique. Instruments were in the form of teacher observation sheets, student observation sheets, and student worksheets. The data analysis technique was done by quantitative descriptive. The result of this study is the Problem Based Learning model integrated with the 'Questions-Students-Have' strategy can stimulate students to ask questions and be able to improve students' ability to ask questions.

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### INTRODUCTION

Education is a conscious effort made to develop the ability of Human Resources (HR) through teaching activities (Syah, 2003). The low quality of education requires comprehensive handling. This is because in the life of a nation, education plays a very important role to ensure the survival of the state and nation. Education is also a vehicle to improve and develop the quality of human resources (Mulyasa, 2015). The realization of quality education also requires continuous efforts to improve the quality of education. The realization of quality education requires efforts to improve the quality of learning because the objectives of various educational programs is the implementation of quality learning programs (Uno & Satria, 2013). Efforts to realize a quality learning program can be done by increasing the activities of the learning process. Questions are an important aspect of learning that prioritizes active students and stimulates students to think critically.

Questions are important at school and in everyday life. Questions are the stimulus that can encourage students to think and learn (Nasution, 2015). One form of expression of student's curiosity is asking questions. For teachers, questions asked by students are the key to identify students' prior knowledge and things they do not know (Widodo, 2006). Asking questions can develop students' curiosity and students will be able to become reliable and independent thinkers (Hakiim, 2009).

The factors that influence students' ability to ask questions are the lack of self-confidence in students, which causes students to be less active in questioning activities (Prilanita, 2017). The questions asked by the teacher were far more than the questions asked by students (Widodo, 2006). Samosir (2019) revealed that all students asked questions in writing. This can happen because of time constraints that do not allow all students to ask orally in the learning process (Samosir, Hasruddin & Herawati, 2019).

Through the ability to ask questions, it can make it easier for teachers to identify the difficulties of students' thinking processes and can also improve and enhance student learning processes (Wahyudhiatmika, 2015). A teacher must be able to motivate students to be able to carry out the thought process by stimulating children to ask questions (Novia, Idad, & Sumiyati, 2017). The process of biasing students to ask questions will help students use thinking more deeply, both when asking and answering questions. This process will also involve students' thinking to actively construct new thoughts and knowledge (Husna & Yayan, 2015).

According to Benjamin S. Bloom, the taxonomy (grouping) of educational goals must always refer to three types of domains (guided areas or domains) that are attached to students, i.e., the realm of thinking processes (cognitive domain), the realm of values or attitudes (affective domain), the realm of skills (psychomotor domain) (Sudijono, 2011). Bloom's taxonomy has only one dimension, while the revised taxonomy has two dimensions. The taxonomy that has been revised by Anderson and Krathwol changes into the dimension of cognitive processes and dimension of knowledge. Dimension of cognitive processes consist of remembering, understanding, applying, analyzing, evaluating, and creating. Meanwhile, the knowledge dimension consists of factual knowledge, conceptual knowledge, procedural knowledge, and metacognitive knowledge (Anderson & Krathwohl, 2014).

The thinking ability possessed by students is not the same. Therefore, teachers can find out the limits of students' thinking abilities through a variety of questions asked. One of the learning strategies that can stimulate students to ask questions is the 'Questions-Students-Have' (QSH) strategy. The QSH learning strategy is one strategy that can train students to ask questions. Zulfiani (2018) states that QSH strategy is needed to help students ask questions related to material that they have not understood in writing. This is consistent with Macheasy (2008) who states that the QSH strategy uses a technique to get student participation through writing. This strategy is very well used for students who are not brave enough to ask questions.

Several techniques or strategies can be integrated with learning models to improve the ability to ask questions. Among several models that can foster the ability to ask questions, one of them is the Problem Based Learning model. According to Fauzan, Abdul, and Muhammad (2017), Problem Based Learning (PBL) model fosters and develops students' ability to identify problems, the ability to conclude results, and time management skills. The PBL model can increase understanding and skills in expressing opinions and ideas in front of the class. The PBL model can train students in critical thinking because in the process, the class that applies PBL is guided gradually to lead to critical thinking (Noprianda, Meiry, & Zulfiani, 2016).

Combining the PBL model with the QSH strategy can improve students' thinking skills in the learning process. The PBL model requires students to learn to solve a problem, while the QSH strategy requires students to find problems and write questions related to the problems found in

writing. This is consistent with the statement of Kurniasih, Ramadhan, and Azwir (2015) stating that the PBL model integrated with the QSH strategy is directed at finding problems and finding collaborative and student-centered problem-solving. In contrast to the results of previous studies, this study focuses on analyzing the types of oral and written questions by combining the PBL model with the QSH strategy which can improve the ability of students in the learning process.

## RESEARCH METHODS

### Research Design

The research approach used is quantitative approach. The research method used in this research is the descriptive research method. The examined aspect in this study is the type of student's questions in learning biology using Problem Based Learning with 'Questions-Students-Have' strategy.

### Population and Samples

The target population in this study was all students of SMAN Tangerang. The reachable population is Year XI students of SMAN Tangerang for the academic year 2019/2020. The sample of this study is year XI MIA 3 SMAN Tangerang. The sampling technique in this study was carried out by the purposive sampling technique. Purposive sampling is sampling based on objectives, so it cannot be done randomly. The class that is taken as a sample is a quite active class in asking questions.

### Instruments

The instruments used in this study were observation sheets and Student Worksheets (LKPD). The observation sheets used were student observation sheets and teacher observation sheets. Student observation sheets consist of learning process sheets and student question sheets which are used to record and analyze student questions both orally and in writing. The worksheet given is problem-based worksheet, i.e., the application of the Problem Based Learning model. The students were also given a question sheet so that students ask questions in writing according to the 'Questions-Students-Have' strategy.

### Procedures

This study has a research procedure consisting of three stages, i.e., the research preparation stage, the research implementation stage, and the final research stage.

#### 1. Research Preparation Stage

The research preparation stage was carried out before the research began, while the steps taken include reviewing the literature (textbooks, journals, and other reading sources) related to the study. In addition, observations were made to schools where the study was conducted to determine the character of students and the learning process of biology in schools. Next, researchers made research instruments, and also RPP and LKPD for three meetings.

#### 2. Research Implementation Stage

This study was carried out by observing the process of learning biology activities with the application of an integrated Problem Based learning model with the 'Questions-Students-Have' strategy in Year XI MIA 3. The observation process was carried out by observing the activities of students in the classroom in carrying out the learning process. The application of the Problem Based Learning model integrated with the 'Questions-Students-Have' strategy at the learning model stage was shown in stage-3, guiding individual and group investigations.

#### 3. Data Collection Stage



The technique of collecting data for questions carried out orally and in writing is described in the following Table I.

**Table I.** Data Collection on the Implementation of QSH with PBL

| No | Data Collection | Stages  | Activity   |
|----|-----------------|---------|--|
| 1. | Oral            | Stage 1 | Providing Problem Orientation                        |
|    |                 | Stage 2 | Organizing students to learn                         |
|    |                 | Stage 3 | Guiding individual and group investigations          |
|    |                 | Stage 4 | Developing and presenting the work                   |
|    |                 | Stage 5 | Analyzing and evaluating the problem-solving process |
| 2. | Write           | Stage 3 | Guiding individual and group investigations          |

The collection of oral questions was obtained during the learning process so that the observer recorded every question asked by the students. Written questions were obtained with the 'Questions-Students-Have' strategy which was carried out in stage-3 of the Problem Based Learning model, i.e., guiding individual and group investigations.

Implementation at this stage is to analyze the data obtained from the research implementation stage. Data processing was carried out by processing observation sheets. Data processing was done by counting the number of students who were asking questions both orally and in writing at each meeting, analyzing questions based on cognitive domains and knowledge dimensions based on Revised Bloom's Taxonomy, and analyzing types of questions based on open and closed questions.

### Data Analysis

The data obtained from the observations were then differentiated based on the number of oral and written questions. These were then analyzed into cognitive categories and the dimensions of knowledge from Bloom's revised taxonomy as well as types of open and closed questions. The data analysis technique used is descriptive quantitative. The data were made in the form of percentage and then described based on the literature

## RESULTS

The description of the data based on the types of questions in this study were described in several components, i.e., the number of students asking and students questions, an also the quality based on the types of student questions. Below is further explanation for the data obtained in this study:

### Quantity of Students Asking and Students' Questions

The number of students asking questions was obtained based on the number of students who asked orally and in writing. The number of students asking orally and in writing can be seen in Figure I.

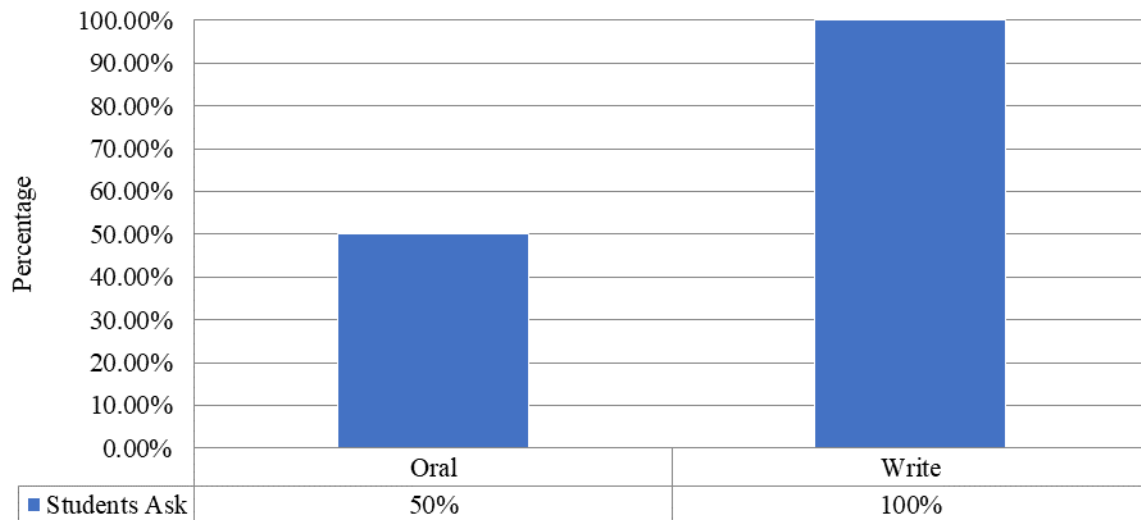


Figure I. Percentage of Student Quantity Asking Oral and Written

Figure I shows the percentage of the number of students who asked questions orally and in writing during the three meetings reaching 50% of the total 36 students. Students who asked orally amounted to 18 people, while the total number of students who asked written questions was 36 students. The number of students asking and students' questions at each meeting is presented in Table 2.

Table 2. Results of the quantity analysis of the number of students and students' questions at each meeting

| Aspect            | N  | Oral (%)  |                            |  | N   | Write (%)   |                            |  |
|-------------------|----|---|----------------------------|--|-----|---|----------------------------|--|
|                   |    | the meeting   |                            |  |     | the meeting   |                            |  |
|                   |    | I   | II                         | III  |     | I   | II                         | III  |
| Students Ask      | 36 | 6<br>(16.67)  | 7<br>(19.44)               | 11<br>(30.56)                              | 36  | 36<br>(100)   | 36<br>(100)                | 36<br>(100)                                |
| Student Questions | 30 | 9<br>(30)   | 8<br>(26.67)               | 13<br>(43.33)                              | 131 | 48<br>(36.64)   | 40<br>(30.53)              | 43<br>(32.83)                              |
| Sub Material      | -  | Function , blood compo nents, blood group, and blood clotting | circulat ory system organs | Circulato ry system disorders and diseases | -   | Function , blood compo nents, blood group, and blood clotting | circulator y system organs | Circulator y system disorders and diseases |

Based on table II, the number of students who ask questions and students' questions are dominated by the type of written questions. The number of students asking orally at the most at the third meeting was 30.56% and all students asked questions in writing at the third meeting.

The percentage of students' oral questions dominated at the third meeting of 43.33% on the matter of disorders and diseases of the circulatory system. Written questions dominated in the first meeting by 36.64% on the material function of the circulatory system, blood components, blood type, and blood clotting mechanisms. The number of students who ask questions orally and in writing tends to increase at each meeting.

The analysis results of the classification of students' questions based on cognitive levels in the revised Bloom's taxonomy, dimensions of knowledge, and types of open and closed questions are presented in Table 3.

**Table 3.** Results of the classification analysis of the quality of students' questions

| No | Tier Cognitive     | Knowledge Dimension | Open/<br>Closed | Oral | %     | Write | %     |
|----|--------------------|---------------------|-----------------|------|-------|-------|-------|
| 1  | C1<br>(Remember)   | factual             | Open            | -    | -     | 1     | 0.76  |
|    |                    | Conceptual          |                 | -    | -     | 3     | 2.29  |
|    |                    | Procedural          |                 | -    | -     | -     | -     |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
|    |                    | factual             | Closed          | 2    | 6.67  | 2     | 1.53  |
|    |                    | Conceptual          |                 | 1    | 3.33  | 9     | 6.87  |
|    |                    | Procedural          |                 | -    | -     | -     | -     |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
| 2  | C2<br>(Understand) | factual             | Open            | -    | -     | 3     | 2.29  |
|    |                    | Conceptual          |                 | 5    | 16.67 | 29    | 22.14 |
|    |                    | Procedural          |                 | -    | -     | 2     | 1.53  |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
|    |                    | factual             | Closed          | 1    | 3.33  | 1     | 0.76  |
|    |                    | Conceptual          |                 | 2    | 6.67  | 9     | 6.87  |
|    |                    | Procedural          |                 | -    | -     | -     | -     |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
| 3  | C3 (Apply)         | factual             | Open            | 1    | 3.33  | 1     | 0.76  |
|    |                    | Conceptual          |                 | -    | -     | 1     | 0.76  |
|    |                    | Procedural          |                 | 2    | 6.67  | 4     | 3.05  |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
|    |                    | factual             | Closed          | -    | -     | -     | -     |
|    |                    | Conceptual          |                 | -    | -     | 1     | 0.76  |
|    |                    | Procedural          |                 | -    | -     | 1     | 0.76  |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
| 4  | C4<br>(analyze)    | factual             | Open            | 3    | 10    | 9     | 6.87  |
|    |                    | Conceptual          |                 | 8    | 26.67 | 36    | 27.48 |
|    |                    | Procedural          |                 | -    | -     | 3     | 2.29  |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
|    |                    | factual             | Closed          | -    | -     | 1     | 0.76  |
|    |                    | Conceptual          |                 | 1    | 3.33  | 1     | 0.76  |
|    |                    | Procedural          |                 | -    | -     | -     | -     |
|    |                    | Metacognitive       |                 | -    | -     | -     | -     |
| 5  | C5 (Evaluate)      | factual             | Open            | 1    | 3.33  | 4     | 3.06  |
|    |                    | Conceptual          |                 | 2    | 6.67  | 9     | 6.87  |
|    |                    | Procedural          |                 | -    | -     | -     | -     |

| No            | Tier Cognitive | Knowledge Dimension | Open/<br>Closed | Oral | %    | Write | %    |
|---------------|----------------|---------------------|-----------------|------|------|-------|------|
| 6             | C6<br>(Create) | Metacognitive       | Closed          | -    | -    | -     | -    |
|               |                | factual             |                 | 1    | 3.33 | -     | -    |
|               |                | Conceptual          |                 | -    | -    | 1     | 0.76 |
|               |                | Procedural          |                 | -    | -    | -     | -    |
|               |                | Metacognitive       |                 | -    | -    | -     | -    |
|               |                | factual             |                 | -    | -    | -     | -    |
|               | Conceptual     | Open                | -               | -    | -    | -     |      |
|               | Procedural     |                     | -               | -    | -    | -     |      |
|               | Metacognitive  |                     | -               | -    | -    | -     |      |
|               | factual        |                     | -               | -    | -    | -     |      |
|               | Conceptual     |                     | Closed          | -    | -    | -     | -    |
|               | Procedural     |                     |                 | -    | -    | -     | -    |
| Metacognitive | -              | -                   |                 | -    | -    |       |      |
| <b>Amount</b> |                |                     |                 | 30   | 100  | 131   | 100  |

Table III shows the results of the overall question classification with a total of 161 questions consisting of 30 oral questions and 131 written questions. Verbal and written questions were dominated by cognitive analysis level questions (C4), the dimensions of knowledge are conceptual categories with open-ended questions with a percentage of oral questions of 26.67% and a percentage of written questions is 27.48%.

This study used three LKPD. In each group meeting, students work on one LKPD. In the first meeting, the LKPD was given regarding the problem of abnormalities in the blood related to blood components, blood clotting processes, and the blood group system. Then, in the second meeting, the LKPD was given regarding the problem of passive smoking, which is also prone to heart attacks related to the organs of the circulatory system. In the, third meeting, the LKPD was given regarding the problem of the characteristics of stroke based on comorbidities. The value of the students' worksheet (LKPD) can be seen in Table 4.

**Table 4.** Students' worksheet grades

| Meeting     | Group |       |       |       |       |       | Average |
|-------------|-------|-------|-------|-------|-------|-------|---------|
|             | 1     | 2     | 3     | 4     | 5     | 6     |         |
| Meeting I   | 66.67 | 66.67 | 73.33 | 66.67 | 73.33 | 73.33 | 70      |
| Meeting II  | 86.67 | 80    | 80    | 73.33 | 86.67 | 80    | 81.11   |
| Meeting III | 80    | 86.67 | 86.67 | 73.33 | 86.67 | 86.67 | 83.34   |
| Average     | 77.78 | 77.78 | 80    | 71.11 | 82.22 | 80    | 78,15   |

Data in Table 4 describe the average value of LKPD in the three meetings amounted to 78.15. Based on the data, Table IV shows that there is an increase in the average value of the LKPD in the three meetings, i.e., 70, 81.11 and 83.34.

The observation sheet was made based on the syntax or stages of the model and strategy used. The learning process used the Problem Based Learning (PBL) model integrated with 'Questions-Students-Have' (QSH) strategy. The results of teacher activity observation data can be seen in Table V.

**Table 5.** Teacher activity observation data

| No | Stages  | Learning Activities  | Meeting (%) |     |     |
|----|---------|--|-------------|-----|-----|
|    |         |  | I           | II  | III |
| 1. | Stage 1 | Student orientation on problems  | 100         | 100 | 100 |
| 2. | Stage 3 | Organizing students to learn   | 100         | 100 | 100 |
| 3. | Stage 3 | Guiding individual and group investigations<br>(integrated with the QSH strategy)  | 100         | 100 | 100 |
| 4. | Stage 4 | Developing and presenting the work   | 100         | 100 | 100 |
| 5. | Stage 5 | Analyzing and evaluating problem-solving<br>process (integrated with QSH strategy) | 75          | 100 | 100 |

Table 5 shows the result of calculating teacher activity observations during the learning process. Based on the results of observations at the first meeting, the model had not been fully implemented. The model had not been implemented in Stage 5, the analyzing and evaluating the problem-solving process (integrated with the QSH strategy), due to insufficient time. In the second and third meetings, all stages were carried out fully, reaching 100%. Table VI shows the data from the observation of students' activities during the learning process.

**Table 6.** Students' activity observation data table

| No | Stages  | Learning Activities   | the meeting (%) |     |     |
|----|---------|---|-----------------|-----|-----|
|    |         |   | I               | II  | III |
| 1. | Stage 1 | Student orientation on problems   | 100             | 100 | 100 |
| 2. | Stage 3 | Organizing students to learn  | 83              | 100 | 100 |
| 3. | Stage 3 | Guiding individual and group investigations<br>(integrated with the QSH strategy) | 88              | 93  | 100 |
| 4. | Stage 4 | Developing and presenting the work  | 100             | 100 | 100 |
| 5. | Stage 5 | Analyze and evaluate problem solving process<br>(integrated with QSH strategy)    | 100             | 100 | 100 |

Based on Table 6, some stages at the first meeting had not been fully implemented. These stages were the stage of organizing students to learn (83%), and guiding individual and group investigations (integrated with the QSH strategy) (88%). In the second meeting, some stages of students' activities had not been fully implemented. These stages were guiding individual and group investigations (integrated with the QSH strategy) with a percentage of 93%. In the third meeting, based on the results of student observations, all stages had been carried out (100%).

## DISCUSSION

The 'Questions-Students-Have' (QSH) strategy does not only provide a stimulus for students to ask questions in writing, but also helps students to actively ask questions orally. Problem Based Learning (PBL) model is also contextual learning model to stimulate students to learn. This is confirmed by Kurniasih (2015) who states that in the PBL model in the form of QSH, students



are directed to look for problems and find solutions to encountered problems together and learning is more student-centered.



**Figure 2.** Field Documentation

Based on field notes, due to time constraints the opportunity for students to ask orally could not all be accommodated and discussed. According to Samosir, Hasruddin, and Herawati (2019), students are more dominant in asking questions in writing. This can happen due to time constraints that do not allow all students to ask orally in the learning process. Factors within students can also influence the number of students asking questions. The students' lack of confidence made them not dare to ask questions.

The number of students who asked questions orally and in writing tended to increase. The QSH strategy does not only stimulate students to ask questions in writing, but also helps students to actively ask questions orally. This increasing pattern can be related to the subject matter at the third meeting which is increasingly interesting, i.e., disorders and diseases of the circulatory system. There is a relationship between the increasing number of questions and the activeness of students in asking questions regarding the subject matter.

The increase in students' questions at the third meeting was also strengthened by the implementation of all observations of teacher activity and student activity. The average value of LKPD at the third meeting was 83.34. This is consistent with Hayati, Sukarni, Yuliaty (2016) who state that the variety of the arising questions can be seen in the process of learning activities carried out on each material. The learning process influences the variety of student questions. The teacher must prepare a learning implementation plan that is in line with the characteristics of the material

and the characteristics of students. Thus, the teacher can maximize the subject being studied. This proves that students actively ask questions orally and in writing at each meeting. The increase in verbal questions at each meeting proves that the implementation of learning strategies and the learning process runs more actively so that students dare to ask questions. This result is confirmed by Bahri, Andi, Nur's (2012) study which explains that the use of this QSH strategy is a learning strategy to actively ask questions and express ideas.

The analysis of oral questions at the cognitive level was dominated by analyzing questions (C4). Questions were obtained at the cognitive level of remembering (C1) to the level of evaluating (C5). The arising questions were also more diverse and no longer dominated by questions with low cognitive levels. Overall, the questions were evenly distributed at low-level cognition and high-level cognition. The following questions can illustrate the varying quality of cognitive level questions asked by students.

" Why do people who live in mountainous areas have blood that has more erythrocytes?" (PD11)

"If a pregnant woman has a stroke, what will happen to the fetus?" (PD28)

"How do nurses work when injecting needles into patients?" (PD5)

The variety of questions obtained was also strengthened by the level of implementation of the activity stages on the observation sheet and in the LKPD scores obtained at each meeting. The learning process and the material discussed greatly influence the types of questions students ask. The thinking process of students during the learning process increases because of the stimulus from interesting material that is very close to real life. The material of the circulatory system is familiar to students, such as the material on blood function, blood type, and abnormalities or disorders in the circulatory system. This is consistent with Hayati, Asri, Sukarni, and Yuliati (2016) who stated that when viewed from the nature of the material, the objects in the topic of ecosystems are very close to everyday life. This makes students more critical in discussing ecosystem material so that the questions asked can reach the evaluation level (C5).

Students' oral questions were dominated by conceptual category questions. This is in line with the material, the circulatory system, which contains many concepts in its material content. This is reinforced by the results of Amiasih and Sri (2017) that the quality of the types of questions that are dominated by the conceptual knowledge dimension is influenced by factors from the material's subject that require students to understand the material's concepts.

Oral questions based on the types of open and closed questions were dominated by open-ended questions. These results explain that the Problem Based Learning model can stimulate students to think more openly, critically, and creatively. This is in line with Novia, Idad, and Sumiyati's (2017) study which states that this occurs because students have started to think openly and critically in solving problems discussed by students during the learning process. Therefore, the questions asked are not only based on memory or understanding of facts.

The questions obtained in writing were spread evenly. This happened because the opportunity for students to write questions was carried out after the investigation in the PBL stage so that students already have a discourse and the questions obtained will be more diverse. Cognitive level written questions were dominated by understanding questions (C2). The questions obtained were at the level of thinking from remembering (C1) to evaluating (C5). This is confirmed by Chin and Chia (2005) that other advantages of implementing PBL have increased student motivation, add general knowledge beyond the curriculum content, and also trigger the acquisition of critical thinking, creative and problem-solving skills. By asking questions in the problem identification phase in the PBL process, students were stimulated by each other in groups to

contribute material knowledge, make comparisons, argue, apply learning concepts, formulate further questions, and criticize their findings.

The written knowledge dimension questions show that the questions are only contained in the factual, conceptual, and procedural knowledge dimensions questions. During the learning process, there were no questions for the metacognitive category of knowledge dimensions. Questions were dominated by the conceptual category of knowledge dimensions.

The written learning process was also dominated by open-ended questions. This prove that the PBL model can stimulate students to think creatively and also be able to find problems. This is in line with the results of Ayu, Sri, Slamet, Murni and Joko (2015) which state that PBL activities accommodate questions at a higher level of thinking to find solutions to problems.

Learning was carried out in groups with LKPD which was adjusted to the stages of the PBL model integrated with the QSH strategy. The PBL model integrated with the QSH strategy can stimulate students to ask questions and be able to improve students' ability to ask questions. This is reinforced by Kurniasih, Ramadhan, and Azwir (2015) who found that the use of the Problem Based Learning model in the form of the 'Questions-Students-Have' strategy increases student learning outcomes. This is because the learning process opens students' horizons broadly. Students can also explore the knowledge they have while studying, convey what is known, and apply broad thinking to look for problems and respond to a faced problem. Therefore, students become more active and their knowledge is wider.

## CONCLUSION

Based on the results of this study, it can be concluded that the Problem Based Learning model integrated with the 'Questions-Students-Have' strategy can stimulate students to ask questions and be able to improve students' ability to ask questions. Types of student questions based on the quality classification of students' questions orally and in writing were dominated by questions of analyzing cognitive level (C4), and conceptual category knowledge dimensions with open-ended questions. Students were more likely to ask questions in writing than orally.

This study implies that it becomes an alternative biology learning model that can increase the activeness of students in the learning process. In addition, the SQH integrated PBL model can develop students' reasoning and stimulate creative thinking processes. Equipped by LKPD, teachers can apply this model to make it easier for students to express their questions because it is proven that this model explores students' questions more in writing than orally. Application of Problem-Based Learning model integrated with 'Questions-Students-Have' strategy is one way to improve the learning process because it can improve students' thinking skills and also increase students' activity in the learning process.

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## REFERENCES

Amiasih, T., Slamet., S, & Sri D. (2017). Increasing students' ability to ask questions and active communication through the application of a guided inquiry model. *Journal of Bioedukasi*, 10(2). Retrieved from: <https://doi.org/10.20961/bioedukasi-uns.v10i2.11446>



- Anderson, LW, & Krathwohl D. R(eds). (2014). *The basic framework for teaching learning and assessment: Bloom's revised education taxonomy*, Trans. Agung Prihantoro. Yogyakarta: Student Library.
- Ayu, A, G., Widoretno, S., Samtosa, S., Ramli, M., & Ariyanto, J. (2015). Improving the quality of students' questions in learning biology using a problem based learning model in class X Mia 6 SMA Negeri 4 Surakarta, National Seminar XII Biology Education FKIP UNS. Retrieved from: <https://media.neliti.com/media/publications/175121-ID-none.pdf>.
- Bahri, A., Azis, A, A., & Nur, F, A. (2012). Application of active learning strategy question student have and academic ability on cognitive learning outcomes of class VIII students of SMPTN Camba, *Saibsmat Journal*, 1(1), 41-51. Retrieved from: <https://doi.org/10.35580/sainsmat114552012>.
- Chin, C., & Chia, L. (2015). Problem-based learning: using iii-structured problems in biology project work. *Studies in science education*, 90(1), 44-67. Retrieved from: <https://onlinelibrary.wiley.com/doi/10.1002/sce.20097>
- Fauzan, M., Gani, A., Shukri, M. (2017). Application of problem based learning model in learning material on the solar system to improve student learning outcomes, *Journal Indonesian Science Education*, 5(1), 27-35. Retrieved from: <http://jurnal.unsyiah.ac.id/jpsi>.
- Hakim, L. (2009). *Learning Planning*. Bandung: Prima Discourse.
- Fathianihayati, F., Hidayat, S., & Yuliati, Y (2016). Various questions of students in Yogyakarta III in learning biology based on differences in subject matter, *Journal of Biology Education*, 5(7), 27-37. Retrieved from: <http://journal.student.uny.ac.id/ojs/index.php/pbio/article/view/4629/0>
- Husna, N, H., & Sanjaya, Y. (2015). analysis of student questions through learning scientific inquiry using science education comics. *Education*. 7(2), 121-126. Retrieved from: <http://journal.uinjkt.ac.id/index.php/edusains/issue/view/386>.
- Kurniasih, Y., Sumarmin, R., & Anhar, A. (2015). *Paffect the implementation of model problem Based learning* in the form of a question student have strategy on the participants' biology earning competence class XI SMAN I Bayang, *Collaborative Journal*, 2(2), 82-101. Retrieved from: <http://ejournal.unp.ac.id/index.php/kolaboratif/article/view/4973>
- Macheasy, U. (2008). *Active learning in learning Arabic*. Malang: UIN Malang Press.
- Mulyasa, E. (2015). *Development of curriculum implementation*. Bandung: Rosdakarya Youth.
- Nasution, S. (2015). *Didactic principles of teaching*. Jakarta: Earth Literacy.
- Noprianda, M., Noor, M, F., & Zulfiani, Z. (2016). Model students' critical thinking skills Problem based learning and social science technology on the concept of a virus. *Edusains*, 8(2), 182-191. Retrieved from: <http://journal.uinjkt.ac.id/index.php/edusains/issue/view/556>
- Novia, N., Suhada, I., & Saadah, S. (2017). Comparison of students' asking profiles using the quick on the draw model and the picture and picture model in the ecosystem sub-material, *Journal of Biology Education Study Program*, 7(1). Retrieved from: <https://doi.org/10.15575/bioeduin.v7i1.2745>
- Prilanita, Y, N., & Sukirno (2017). Improvement of students' questioning skills through its constituent factors. *Journal of Education Horizon*, 36(2), 244-255. Retrieved from <https://journal.uny.ac.id/index.php/cp/article/view/11223/pdf>
- Samosir, A., Hasruddin, H., & Dongoran, H. (2019). Analysis of the quantity and quality of biology teacher and student questions on the excretory system material. *Journal of Pelita Pendidikan*, 7(1), 009-015. Retrieved from: <https://jurnal.unimed.ac.id/2012/index.php/pelita/index>.
- Sudijono, A. (2011). *Introduction to educational evaluation*. Jakarta: Rajawali Press.

- Shah, M. (2003). *Educational psychology: with a new approach*. Bandung: Rosdakarya Youth.
- Uno, H. B., & Koni, S. (2015). *Learning assessment*. Jakarta: Earth Literacy.
- Wahyudhiatmika, P., Putra, DKNS, & Abadi, I. B, G, S. (2015). Analysis of students' abilities in questioning activities in the learning process with a scientific approach in the 2013 curriculum (the theme of the history of Indonesian civilization) in class V SD Negeri 7 Sasetan, South Denpasar District. *E-Journal Pgsd Ganesha University of Education Department Pgsd*. 3(1). Retrieved from <https://ejournal.undiksha.ac.id/>.
- Widodo, A. (2006). profile of teacher and student questions in science learning. *Journal of education and learning*, 4(2), 139-148. Retrieved from: <http://widodo.staf.upi.edu/files/2011/03/2006-Profil-Pertanyaan-Guru-dan-Siswa-dalam-Pembelajaran-Sains.pdf>
- Widodo, A., Sumiati, Y., & Setiawati, C. (2006). Increasing the ability of elementary school students to ask productive questions. *Journal of Education and Learning*, 4(1), 1-12. Retrieved from: <http://widodo.staf.upi.edu/files/2011/03/2006-Peningkatan-Ability-Students-SD-to-Mengajukan-Pertanyaan-Produktif.pdf>
- Zulfiani, Z., Rosydatun, E, S., Hasiani, S., Rohmatullah, G., & Zuqistya, N. (2018). Comparing between problem based learning combine question students have and problem based learning combine learning journal toward metacognitive skills, Proceedings, presented at the International Conference on Education in Muslim Society (ICEMS), Syarif Hidayatullah State Islamic University Jakarta. Retrieved from <https://www.scitepress.org/Papers/2018/99150/99150.pdf>