



Students' Questioning Skills on Systems of Linear Equations in Two Variables through Problem Based Learning

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ABSTRAK

Penelitian ini bertujuan untuk mendeskripsikan keterampilan bertanya siswa pada materi sistem persamaan linear dua variabel menggunakan *problem-based learning* pada kelas VIII di SMP Al-Islamiah Pamekasan. Metode penelitian yang digunakan metode deskriptif kualitatif dengan teknik pengumpulan data secara observasi, wawancara dan dokumentasi. Teknik analisis data penelitian ini: reduksi data, penyajian data dan penarikan kesimpulan. Hasil penelitian ini menunjukkan bahwa keterampilan bertanya siswa kelas VIII memiliki keterampilan bertanya yang berbeda-beda. Ternyata hal tersebut dapat dilihat dari cara siswa menyelesaikan sebuah permasalahan yang sedang dihadapi, cara siswa menjawab pertanyaan yang ditanyakan oleh guru, dan cara mereka mengajukan pertanyaan. Rata-rata subjek dapat membuat pertanyaan, tetapi dari segi konteks dan kualitas pertanyaan setiap subjek bervariasi serta memiliki ciri khas masing-masing.

ABSTRACT

This research aims to describe students' questioning skills on two-variable linear equation systems using problem-based learning in class VIII at SMP AL-Islamiah Pamekasan. The research method uses a qualitative descriptive method with data collection techniques through observation, interviews and documentation. Data analysis techniques for this research: data reduction, data presentation and drawing conclusions. The results of this research show that class VIII students have different questioning skills. It turns out that this can be seen from the way they solve a problem they are facing, the way they answer questions asked by the teacher, and the way they ask questions. The average subject can ask questions, but in terms of context and quality of questions, each subject varies and has its own characteristics.

Keywords:

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Introduction

Mathematics learning is learning that focuses on developing cognitive, affective and psychomotor aspects (Wijayanti & Khikmiah, 2016). Mathematics is very important for training students to think logically, analytically, systematically, critically, creatively, collaboratively and actively (Handoko, 2017). The emphasis of mathematics learning, both at the basic level and at the higher education level, lies on structuring reasoning and solving problems in mathematics learning (Amir, 2014; Nuritasari, et al, 2023). Solving mathematical problems requires active learning activities or processes. Active learning activities cannot be separated from question-and-answer activities. This activity allows students to interact more actively with the teacher during class learning, starting from asking, answering, and responding. Students will get used to looking for learning material and information through asking questions (Nurfitriyanti, 2016).

Asking questions is one of the things that is very important to understand and apply in the mathematics learning process. Questioning activities can generate effective stimuli that can encourage thinking abilities (Zayyadi et al., 2021; Zayyadi & Lanya, 2023). Students can use their brains more optimally when they are faced with questions that can make them think. Therefore, asking-based learning activities in mathematics learning need to be developed to improve students' thinking abilities. However, after the researchers made observations, students' questioning skills in mathematics subjects were very low. Observations made on students VIII at MTsN 2 Pamekasan showed that students' questioning skills in class VIII Mathematics subjects were relatively low. This can be seen from the results of observations made, there were only 2 students who asked out of 20 students and the other 18 students did not ask at all.

Students' questioning skills do not appear by themselves, but proper learning management can improve students' questioning skills. Good learning involves students being able to actively participate in the learning process. One way to make students more active is to use a problem-based learning model that is appropriate to the subject matter and material being taught (Ariyani & Kristin, 2021). The problem-based learning model that can be used is the Problem Based Learning (PBL) learning model.

Problem Based Learning (PBL) is a problem-based model, in this case students are introduced to a problem and asked to be active in solving the problem (Saputri, 2020). One of the advantages of the problem-based learning model states that the problem-based learning model can increase student learning activities. Student activity in this case is only limited to understanding activity in the sense of asking questions during the mathematics learning process. One material that can use a problem-based learning model is the System of Linear Equations in Two Variables (SPLDV) which is often found in junior high school level mathematics subjects, so it is hoped that this material can be useful for improving students' questioning skills. SPLDV is often used to solve everyday problems, such as economic problems such as calculating the price of a product or a person's age (Suryani, 2012). Because many questions involve SPLDV, it is hoped that students can understand material related to systems of linear equations in two variables.

One of the advantages of the problem-based learning model states that the problem-based learning model can increase student learning activities. Student activity in this case is only limited to understanding activity in the sense of asking questions during the mathematics learning process. There's been a lot of other research on asking questions (Zayyadi, et al, 2023; Zayyadi, et al 2019; Asikin, 2020; Dewi, et al 2020). However, they have not used problem-based learning. Therefore, researchers are interested in conducting this research. This research aims to describe students' questioning skills on two-variable

linear equation systems using problem-based learning in class VIII at SMP AL-Islamiyah Pamekasan.

Methods

The method used in this research is a qualitative descriptive method. According to (Sugiyono, 2020) qualitative research methods are an umbrella for all types of research approach methods used to research social/natural life. In this research, the information obtained was analyzed qualitatively (non-quantitatively). The informant in this research was a mathematics subject teacher who provided information about the situation and conditions of the research setting. Meanwhile, the research subjects were 2 students who were selected based on the students' high activeness scores when learning mathematics, as well as recommendations from mathematics subject teachers.

The data used in this research is qualitative data. Qualitative data is data that explains a phenomenon based on general things and cannot be counted. The qualitative data referred to in this research is in the form of observations, interviews and documentation. The data sources in this research are 2 class VIII students who were selected based on the students' activeness scores during previous mathematics lessons and the mathematics teacher at Al-Islamiyah Middle School Pamekasan.

In the collection process itself, the researcher compiles the instruments, including creating a grid of instruments from existing theories that are appropriate to the variables studied. The instruments used by researchers include an observation guide in the form of a check list which focuses on students' questioning skills regarding the material on systems of linear equations in two variables with a total of 4 indicators of good questioning skills, an interview guide with the class VIII mathematics teacher and 2 class VIII students who were selected to be research subjects, and documentation of teacher and student interviews, and photographs during research observations.

Before this observation activity is carried out, the observation sheet is first consulted with one lecturer and one teacher who is an expert in the field or a mathematics subject teacher to determine the validity of the observation sheet. Validity is used to measure the ability of research tools to measure observation sheets, meaning that the observation must be able to reveal the skills possessed by students based on the indicators used.

This research uses indicators for asking skills regarding the criteria for good questions, where good questions include the following four things: 1) short and clear, 2) have focus, 3) are probing or divergent, 4) have clear intonation and volume (Hosnan, 2016). Which can be seen in Table 1.

Table 1. Indicators of Questioning Skills

Aspect	Indicator	Description
Questioning Skills	1. Short and Clear	The questions are easy to understand, not complicated, and the questions are straight to the point.
	2. Have focus	Questions must be appropriate to the topic of discussion and in accordance with what you want to ask and its purpose.
	<i>Probing or divergent</i> in nature	The questions asked are varied and have clear and deep meaning.
	Has clear intonation and volume	Questions must use clear intonation, and the volume must be able to reach the entire class.

The data collection technique in this research uses passive participant observation, when the researcher comes to the research location, the researcher only observes the mathematics learning process and records it on an observation sheet in the form of a check list according to the variables to be studied, namely students' questioning skills regarding the system material. two variable linear equations using problem-based learning. A conversation

between two people, one being the source of information and one being the questioner, is called an interview (Meleong, 2017). Researchers chose to use semi-structured interview techniques. Researchers prepared research instruments in the form of written questions. The interview between the researcher and the person providing the information (informant) in finding the problem is more open and freer, the interviewee is asked for opinions and suggestions, therefore the researcher must pay attention and then note down everything expressed by the subject being interviewed. The researcher can also develop questions outside previously created instruments. Documentation in this research is in the form of activities in the field in the form of photographs during research observations, student data or audio recordings of interviews as evidence of these activities.

In this study, researchers used a credibility test. Researchers used triangulation techniques as a data checking technique. Triangulation in testing credibility is defined as examining data from various sources in various ways and at various times (Sugiyono, 2019). In this study, researchers used time triangulation. Miles and Huberman explain that data analysis can be done in 3 ways, namely data reduction. Summarizing, focusing on the main things, and selecting the data obtained is called data reduction. Data display (Miles & Huberman, 1992). The collected data regarding students' questioning skills on two-variable linear equation systems using problem-based learning is presented in the form of short descriptions, so that they are easy to understand, making it possible to draw conclusions/verify. Documentation is presented to confirm the data obtained and draw conclusions Verification / conclusion).

Result and Discussion

This research was carried out at Al-Islamiyah Pamekasan Middle School. The research was carried out directly in the field which was carried out from 14 May 2024 to 29 May 2024 by observing during 2 meetings, in these meetings the researcher was able to find out the conditions and activities during learning in class VIII of Al-Islamiyah Pamekasan Middle School. This research examines students' questioning skills regarding two-variable linear equation systems using problem-based learning. The mathematics learning examined in this research is as in Figure 1.



Figure 1. Mathematics learning uses problem-based learning

The criteria for good asking skills can be seen from the indicators of asking skills according to (Hosnan, 2016), namely that good questions include the following four things: 1). short and clear, 2). have focus, 3). probing or divergent, 4). Has clear intonation and volume. Based on the results of the first observation which was carried out on May 14, 2024,

researchers collected data by making observations by filling in a check-list table. During the mathematics learning process regarding systems of linear equations in two variables using problem-based learning, the first subject chosen asked 2 questions and the second subject asked 1 question. However, only the first subject met the 4 indicators of questioning skills. On the second day of observation which was carried out on May 29, 2024, the researcher collected data again by making observations, namely filling in the check-list table. During the mathematics learning process with the same learning material and model, the results obtained were that the first subject chosen asked 2 questions and the second subject asked 2 questions. However, only the first subject meets the 4 indicators of questioning skills.

The results of the data presentation and research findings show that short and clear indicators can be achieved by both subjects. Short and clear indicators are indicators that are easy to achieve because short and clear indicators can be achieved using simple language in the hope of making it easier for someone to understand the question. This is in accordance with Mulyasa who stated that the expression of questions should be brief and clear (Mulyasa, 2010), so that questions can be easily understood using simple sentence structures and words that are often recognized and according to their level of development.

The second indicator is having focus. This indicator can also be interpreted as an easy indicator because it does not stimulate students' thinking power, but only focuses on factual knowledge so that both subjects are able to achieve this indicator. This is in accordance with Rowe who stated that focused questions are not an appropriate means of stimulating students' thinking power for discussion (Orlich et al., 1998). In general, these questions are fact or memory questions and are often part of low-level questions. It usually elicits short responses from students and focuses on a lower level of thinking, namely understanding or knowledge. Actually, the question is not bad but, in many situations, it will dictate that the student must demonstrate knowledge of facts and specifications.

The third indicator is probing or divergent from the results of observations and interviews that have been carried out. This third indicator is a difficult indicator because only the first subject can achieve it in its entirety, while the second subject does not meet the third indicator. This indicator requires students to think critically, therefore not all students can achieve this third indicator. In fact, if students can master this indicator, they can obtain more information than before. This is in accordance with Beamon who stated that questions with probing or divergent indicators are very suitable for building the self-confidence of students who have difficulty learning because probing or divergent questions do not always have right or wrong answers (Zayyadi, et al, 2019). So, most students find it difficult when faced with probing or diverging indicators.

The fourth indicator is having clear intonation and volume. This indicator is an indicator that also does not require thinking power but requires self-confidence. Self-confidence can also inspire oneself to do things responsibly because they are confident in their abilities. Students who have high self-confidence will complete their assignments well and can be responsible for the results they obtain (Fatkuliza et al., 2023). Therefore, someone who has high self-confidence will dare to ask questions. In accordance with the research results, both subjects were able to fulfill the fourth indicator because both subjects had self-confidence because they were used to asking questions in class according to the results of the activeness value which included aspects of courage to ask and answer questions from the teacher and other students.

So, indicators that are short and clear, have focus, and have clear intonation and volume are indicators that are considered easy by students because from the questions asked, questions that have these indicators can almost be achieved by all subjects. However, unlike the third indicator, which is probing or divergent, this indicator can only be achieved

optimally by one subject. Therefore, there is a need for cooperation between teachers and students, especially to improve probing or divergent indicators, one of which is by asking for agreement on the teacher's views, giving other students the opportunity to unite their opinions on the answers given by their friends, asking for appropriate answers, and asking students to explain their answers clearly. other words or sentences so that the answer is better (Maulana, 2017).

From the achievement of indicators of asking ability by the two different subjects, it turns out that this can be seen from how they solve a problem they are facing, how they answer questions asked by the teacher, and how they ask questions. The average subject can ask questions, but in terms of context and quality of questions, each subject varies and has its own characteristics.

Conclusion

Based on the results of research conducted on 2 class VIII students at Al-Islamiyah Pamekasan Middle School, it was found that students who had high activeness scores when learning mathematics did not guarantee that the students' questions could meet all the indicators of asking skills, especially in the third indicator, namely probing or divergent, where the third indicator This is a difficult indicator because this indicator requires students to think critically, therefore not all students can achieve this third indicator easily.

The limitation of this research is that during the interviews, the subjects still felt embarrassed and were less able to explain the questions the subjects asked when the researchers made observations, so the researchers had to persuade and seduce the subjects several times to want to be interviewed and conducted the interviews slowly. For future researchers, this research is still limited to subjects that have high activeness values and learning models that are often used. Future researchers should study using different criteria, for example by looking at the activity of students at medium and low levels, and can also use newer learning models or learning models that are rarely used.

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