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Research Article

# Self-Description and Observers' Perspective Toward Science Teachers' Ability in Using Questioning Technique in Middle School

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***Abstract***

*The study aimed at inquiring how science teachers use question technique in the teaching-learning process. The methodology used in this study was a survey method of quantitative approach. The population is all senior high school Physics teachers in Banda Aceh. The sample is the Physics teachers regarding their length of duty which were six teachers from six schools. The sampling technique was using disproportionate stratified random sampling based on the schools' accreditation. The data collection process was carried out by distributing the questionnaire to teachers and documentation technique by videotaping the learning process. The data were analyzed using a descriptive technique. The results showed that teachers used redirecting technique (70%) and probing technique (45.83%). Next, the teachers' experience only impacts the probing technique. A suggestion that can be made in teaching Physics, teachers should ask questions that track and test students' understanding toward a concept that they have learned.*

**Keywords:** *teachers' questioning technique, redirecting technique, probing technique, teaching and learning in Physics*

## Teknik Bertanya Guru Sains dari Deskripsi Diri dan Perspektif Pengamat pada Sekolah Menengah

***Abstrak***

*Penelitian ini bertujuan untuk mengetahui teknik bertanya yang digunakan guru dalam proses pembelajaran fisika. Metode yang digunakan dalam penelitian ini adalah metode survey dengan pendekatan kuantitatif. Populasi dalam penelitian ini seluruh guru fisika di SMAN Kota Banda Aceh. Sampel yang digunakan adalah guru bidang studi fisika berdasarkan lamanya masa kerja yang berjumlah enam orang dipilih dari enam sekolah yang berbeda menggunakan teknik sampel acak strata disproporsi berdasarkan akreditasi sekolah. Teknik pengumpulan data dilakukan dengan memberikan angket teknik bertanya kepada guru dan dokumentasi perekaman proses pembelajaran dengan video. Data hasil penelitian dianalisis menggunakan teknik deskriptif. Hasil penelitian menunjukkan bahwa guru mengajukan pertanyaan menggunakan teknik redirecting (70%) dan teknik probing (45.83%).*

*Selanjutnya, pengaruh pengalaman mengajar guru hanya terjadi pada teknik probing. Adapun saran untuk meningkatkan teknik probing dalam pembelajaran fisika guru harus mengajukan pertanyaan yang bersifat melacak untuk menguji sejauh mana peserta didik mampu memahami konsep yang sudah dipelajari.*

**Kata Kunci:** *Teknik bertanya guru, teknik redirecting, teknik probing, pembelajaran fisika*

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## I. INTRODUCTION

The teaching and learning process of Physic should involve more students actively. However, the reality showed that in Physics teaching and learning process, students are still involved passively as the teaching objects [1]. To solve the problem, teachers should be able to help students actualize themselves which can be done through several ways, one of them is questioning techniques [2]. Questioning is an essential part in developing the Curriculum of 2013 through the scientific approach that can make students more active in constructing their knowledge [3]. In teaching and learning process, well-arranged questions and good asking technique can give positive impacts to the students' activity and creativity [4]. Briefly, it is important to Physics teachers to ask questions during the teaching and learning process to build a good learning interaction so that all students can participate.

Asking appropriate questions needs a questioning technique so that it can ignite students to think an attempt to answer the teacher's questions and students can participate actively in the questioning and answering process [5,6]. During this time most teachers asked a type of question on low-level cognitive to increase participation and understanding of learners in the learning process. Previous research has much to say about the types of questions that teachers asked and they are divided into two groups, namely low-level cognitive questions and high-level cognitive questions [7]. In addition, Zahra also stated that the most frequently asked questions by the teacher are directing questions [8]. But in fact, there are very few studies that review the technique of teachers who do questioning in Physics learning. The appearance of questions in the learning process depends on the ability of the technique to ask used by the teacher. Therefore, the skill and the fluency of questioning that the teacher used needs to be improved, regarding both the content aspect and the technical aspects of questioning. According to Indrawati to increase the students' participation, two questioning techniques can be used they are redirecting technique and probing technique [9]. Therefore, this study will comprehend questioning the skill of science teachers to improve students' interest and motivation, and also identify how the teachers' experience influence questioning technique used in physics learning is.

A good questioning technique can ease the students in processing and accepting the answers. Probing technique emphasizes the teacher's skill in asking a question in the attempt to know the students' comprehension toward the concept being learned [10]. Because of that reason, teachers should use proper voice and easily audible in communicating so she/he can understand the students' statements or opinions [11]. Then, redirecting technique aims to involve a lot of students in the teaching and learning process [12]. So, teachers should ask questions that spread the students' attention in random ways during the learning process because it will lead the discussion [13]. Through appropriate questions, teachers were able to catch students to pay more curiosity about the concept being learned; besides, it can give new insights for students [14, 15]. Also, teachers can use the questioning technique by modeling the students' curiosity and encourage them to ask questions [16].

The importance of questioning technique has not been pushed core attention for many teachers yet. Based on the observation in SMAN 2 Banda Aceh, it was found that the students were less active in the Physics teaching and learning process and students did not pay attention to the teachers' explanation, and when the teachers asked questions, they could not answer logically. Some previous studies exhibited that teachers, apparently, still have problems in asking good questions to their students and there are unclear questions [17]. Besides that, Ermasari et al. reported that low cognitive level questions dominate teachers' questions and the questioning technique is not effective [18]. Then, Kurniawati also stated that questions provided by the teacher in biology learning emphasized cognitive skills and tended to propose closed questions [8].

Due to on the description above, it was necessary and essential to do research related to the technique of questioning used by teachers in teaching Physics based on teacher's description and the observer's perspective to describe the ability of teachers in applying the technique to ask the physics lesson at SMAN Kota Banda Aceh academic year 2017/2018. Through this research, it is also expected that the teachers can apply proper questioning techniques in learning, which can explore the ability and creativity of learners in learning so that learners can be encouraged to be more active, creative and innovative and they can think independently for finding the answers. It can also be used as input materials, information for interested other researching parties in the field of education.

## II. RESEARCH METHOD

The methods used in this study was the survey method. The population of this study is all Physics teachers in Banda Aceh senior high schools. The sampling technique was disproportionate stratified random sampling based on the schools' accreditation with category A and B including 6 Physic teachers from SMA Negeri 2, 3, 7, 14, 15 dan 16 Kota Banda Aceh with the longest duty years. The process of the way teachers asks questions was also determined by the length of the period the teachers have been teaching [19].

### Research Instrument

The instrument used in this study was questionnaire with 11 questions wish formulated based on the indicators from redirecting technique and probing technique [9]. Those questioning techniques were used to obtain feedback from students to the questions proposed by the teacher. Thus the observation might be conducted more comfortable and more flexible.

The questionnaire adopted the Likert scale that has four answer choices for the respondents; while the questionnaire for the

observer used Gutman scale with two choices of "yes" and "no" answers. The instrument validation used has the reliability of $\alpha = 0.869$ (very high).

**Data Analysis**

The research activities are carried out in two stages: the first stage, two observers observed the learning process in the classroom and then responded to 11 statements related to the questioning technique used by the teacher during the learning took place through the observation process. Furthermore, in the second stage, the questioning technique was distributed to the teacher after the learning was completed and the teacher responded to the 11 items available on the questionnaire. Then to strengthen the questionnaire results, during the research it was also conducted documentation in the form of recording of teaching and learning activities in the classroom. Additionally, the questionnaire results from both observers and teachers were analyzed using descriptive techniques, and calculated using percentage technique in the equation (1).

$$P = \frac{score\ obtained}{maximum\ score}\ x100\% \qquad (1)$$

## III. RESULTS AND DISCUSSION

The data that were analyzed were transcribed from 6 teachers who had already answered the 11 questions in the questionnaire whose the perfect consistency levels which can be seen from the Cronbach's Alpha, that is 0.869, below is presented the data concerning the questioning technique used by the teachers and the observer's perspectives.

**Table 1. The Result of Teachers' Questioning Technique**

| Teacher | Work Duration (Year) | Questioning Technique Teacher | | | |
|---|---|---|---|---|---|
| | | *Redirecting Technique* | | *Probing Technique* | |
| | | Teachers Pesrspectives Score (%) | Observer's Pesrspectives Score (%) | Teachers Pesrspectives Score (%) | Observer's Pesrspectives Score (%) |
| SY | 22 | 00.00 | 50 | 40.00 | 33.33 |
| NI | 20 | 84.00 | 80 | 100.00 | 33.33 |
| RU | 21 | 53.00 | 80 | 72.72 | 83.33 |
| SU | 25 | 67.00 | 50 | 72.72 | 33.33 |
| BA | 28 | 100.00 | 70 | 100.00 | 58.33 |
| IR | 12 | 75.00 | 80 | 100.00 | 66.67 |
| Average (%) | | 63.00 | 70 | 80.90 | 45.83 |

From Table 1, it can be seen that the teachers' description is different from the observers' perspectives. It was found that the teachers described that there were 80.90% of the teachers strongly agree with the usage of a probing technique compared to redirecting technique—which was only agreed by 63% of them. Whereas, based on the observers' perspective, practically, the teachers mostly used redirecting technique in questioning and the teachers hardly frequent employ the probing technique. Below is narrated the observers' perspective.

**Redirecting Technique**

Based on the highest average score which was obtained from redirecting technique, it was 70%. The difference in results is strongly

influenced by the teaching skills that are owned by a teacher. One of them is on the skills to ask questions in line with the findings of Taufik et al. He stated that the teacher possesses the skills of asking that is the ability to use different types of questions and techniques when asking and using the right method to stimulate learners to think in answering questions asked by teachers [5].

Based on the video observation, it was found that the teachers frequently used redirecting technique during the teaching time, especially in teaching Physics. Redirecting technique used by the teachers is usually only by addressing similar questions to several students. The examples question ordered by teachers:

Teacher: *"Why the wood can be floated on the water surface?"*
Student 1: *"Because the density of wood is less than the density of water."*
Student 2: *"Because of the force worked on the wood to lift is greater than the weight of wood."*
Teacher: *"When the magnetic field will occur?"*
All students: *"When the current flowed among the conductive wire."*

Questions provided by the teacher were open question which needs for in-depth analysis, chronological and conceptual knowledge, and also directed to further discussion. Consequently, it can be concluded that the teachers used redirecting techniques to increase students' participation in learning. This phenomenon is evidenced by the fact that when the teacher provided questions to learners during the observations. The students could clearly and easily understand when the teacher provided sufficient information, provided questions thoroughly and flat, directed and gave time in answering questions, as well as provided opportunities for learners to think. This fact was in line with the finding of Husnawati et al., who stated that basically, teachers use in teaching and learning process [12]. The only way to do this is to ask one question addressed to several learners.

**Probing Technique**

Based on the video observation, it was obtained that teachers' characteristics in using probing technique were generated by reformulating questions into much simpler forms and associate them into daily life facts to figure out how much the students understand the concepts being learned. Although the teacher strongly agreed to use probing techniques in asking questions, during the observation, it was seen that there very few teachers asked questions that fit the aspect of probing technique. Probing technique emphasizes teachers' skills to figure out the students' knowledge toward the concept being learned; besides, the students can understand the concepts in their conceptualizations [20, 21].

Based on the observation (videotape) obtained on the guiding technique (probing) only teacher RU and teacher BA got the highest score. Both of these teachers used the probing technique as they were able to change the question to be more simply and contextualized it to the everyday life to find out how far the students can understand the concepts that have been taught. This fact is in line with the views of Putri et al. that probing techniques emphasize the skills of asking used by the teacher to know the learners' understanding of the concepts that have been taught; besides, the learners can also understand the concept in his understanding [10].

**The Impacts of Teachers' Teaching Experience in their Questioning Technique**

Based on observations by two observers (Table 1), it was found that the six teachers often used redirecting techniques, but teachers with the longest working period were more capable of using probing techniques. The impacts of teachers' training experience in their questioning skills can be seen in Figure 1.

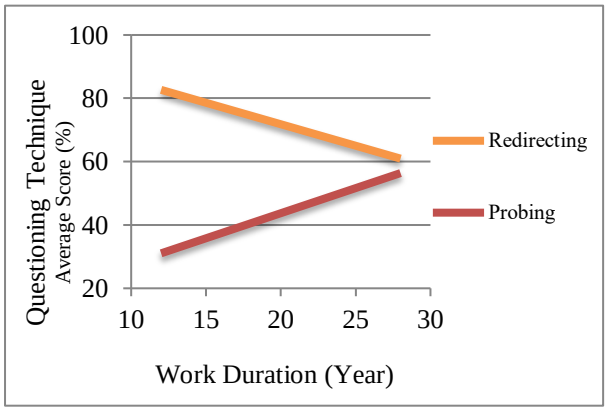


**Figure 1. The Impacts Teachers' Teaching Experience**

The results show that the teachers' teaching experience gives impacts on the teachers' skill in using the questioning technique. From the analysis, it is obtained that those with the working-time more than 25 years, they can use probing technique properly, and those with the working-time less than 25 years, they tend to use a redirecting technique which demands on the students' participation. In probing technique, teachers are demanded in digging the students' hidden capacity [10]. This founding is in line with the result stated by Wang et al. showing that teachers with teaching experience are better at asking higher level questions [19]. Probing technique is a questioning technique that helps this investigation toward the students [22]. In addition, several research results suggest that there are differences of questions posed between novice teachers and experienced teachers. Most of the questions that beginner teachers ask are closed-ended questions that require concise and precise answers and questions rather than require understanding [23].

**Contribution to Literature**

The research explored how to improve learning interest and motivation of students affected by teachers questioning skills and also to identify the influence of the questioning technique applied in physics learning. Furthermore, both redirecting and probing technique was used during this research. Some previous studies barely revealed both of these techniques simultaneously, but they only discussed the techniques in general. According to studies reported by Sofwan [24] and Ayu and Retno [25] related to basic questioning skills of students such as giving waiting time, providing questions to the students clearly and easily, giving questions thoroughly and evenly, directing and giving time to answer the questions.

Based on the analysis result of several studies concerned to questioning skills in learning for the last three years, it appears that investigation to the questioning skill used in learning science is still very seldom, especially in physics learning. Generally, it used in learning of social fields. In year Cahyani et al. researched the students questioning skills in learning Bahasa [13]. Hence, this research is one of the most exciting topics to be studied in the field of science like physics. Besides that, questioning is one of the activities which must be included in the scientific approach and categorized as one of the objectives of 2013 curriculum development. Science has enormous potential as media in developing various thinking skills. Also, the skills can be done by proposing questions using proper questioning techniques.

Generally, several national and international studies were more tend to be focused on the type of questions compared to techniques or strategies in questioning. Ashadi explained that there were four levels of the question, that is level I – low order convergent, level II – high order convergent, level III – low order divergent, and level IV – high order divergent [26]. Then, Davoudi and Narges stated about questioning strategies of high order cognitive skills [27].

The impact of teachers experiences to their questioning skills used in the learning process can be presented clearly in research through their working period. Otherwise, some of the previous studies only described the effects of teachers teaching experience to their questioning skills and generally elaborated in research conducted by Wang et al [19]. Consequently, this point is important to be studied.

In this research, the subject was elected from six schools with different teaching experiences. Contrarily, the previous study only used one population of a school which is reported by Sunardi [4] about the type of cognitive questioning of teachers and students in learning physics in class X of SMA Negeri Kota Palu. Due to several problems above, there was a need to research in term of analyzing the teacher's technique for questioning included redirecting and probing techniques. Questioning used in this research aims to understand how deep the students' comprehension about physics which have been learned, especially in providing the answer when the teacher asked with a question needed for conceptual skill. Therefore, students have no difficulties in learning physics, and they were motivated to learning physics.

## IV. CONCLUSION

Type of questions which were frequently used by physics teacher emphasized to the cognitive skill, although still on the low level in general. The teacher used either redirecting or probing technique with the percentage 70% and 45.83%, respectively. The factor affected the different percentage was teachers' teaching experience, which depends on their working period. Generally, teachers with longtime experience often used probing technique focused on higher-order cognitive skills. Therefore, teachers are recommended to prepare questions which can motivate students to be more active in physics learning in line with balanced cognitive, affective, and psychomotor skills.

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