Questioning skill of science teacher from the students perspective in senior high school

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Abstract. One of the most important emphasis in curriculum of 2013 is to produce graduates who have higher order thinking skill. Implicitly, it proved that graduates students of senior high school still have lack of development of higher order thinking skill. Several theoretical studies showed higher order thinking like creative thinking can be stimulated by teachers who have good questioning skill. This study aims to describe the activities of the questioning skills of physics teacher based on developed instruments. This research used qualitative and quantitative approach with survey technique. The sample was six physics teachers from six different senior high school in Banda Aceh chosen based on working period. Data were collected using questionnaire to indicate students responses. Data analysis with descriptive statistics explained that questioning skill of physics teachers being on moderate category. According to this research, in order to improve questioning skill in physics learning, the teachers need to distribute questions evenly, and the questions asked should be traceable to investigate to what extent for the students to be able to understand all concepts what they have been learned. The influence of teaching experience will be reached on the components of advanced questioning skill based on questions asked.

1. Introduction
Communication is important for learning to improve students participation in teaching process [1]. Teaching science plays important role in improving to make students interesting in asking question [2]. In case, learning science especially in physics is tend to create students to be more passive thus their thinking skill will be decreased [3,4]. One of communication methods to influence students contribution in the class in order to to create effective teaching and learning through questioning [5]. Questioning is one of learning strategies which is believed will be able to facilitate in developing thinking skill to solve the problems, activate the participation in learning, create the interest and motivate them to find or grab new knowledge [6-9].

Questioning activity in education has very important role to improve learning effectivity. The effective question is depend on the use of teachers skills when provided the questions. The teachers who asked the questions must appreciate students responses well and it should be presented with full attention, spirit, polite and does not create confusion and restrict the creative thinking of students [10,11]. Hence, the teachers must mastery the strategies for discussion effectively thus they will be able to submit higher order questions [12]. The higher order question is believed to be able to help analysis and diagnosis for the students and able to evaluate learning progress of learning [13,14].
Therefore, self assessment to the discussion strategies for teachers is very crucial to improve effectiveness and teachers success in physics learning [15,16].

One of discussion strategies for teachers that is able to facilitate critical thinking skills of students is provided by questions with analysis information based on basic fact completely [17]. Creating information in context to fulfill students necessary is can be done by submitting questions in form of 5 “W” + 1 “H” which are what, who, where, when, why and how [18]. But, the effectiveness of those questions supported to learning achievement is still less disclosed. It is in line with Bay who stated that the questions which are provided by teachers and frequently asked on low level for memorizing, understanding, and applied questions [19]. Other than that, many teachers do not provide questions emphasized on critical thinking [20]. Therefore, science teachers are required to present questions in learning process in order to motivate students during learning and to evaluate their progress in learning [21].

According to explanation and introduction above, there are a few studies in reviewing the questioning skill of teachers in physics learning. Through this research, it is expected that teachers are able to apply questioning skill in learning so that the students will motivate to be more active. Besides that, this research data will be very important to find teachers profile who have good ability and skills. This study aims to understand how is teachers ability in applying questioning skill in physics learning in senior high schools in Banda Aceh for academic year of 2017/2018.

2. Method
This research used quantitative approach with survey method. It was conducted for 6 physics teachers in state senior high school number 2,3,7,14,15 and 16 in Banda Aceh which were chose randomly without proportion for working time (disproportionate stratified random sampling) based on school accreditation with category A and B.

Instrument which was used for this research is questionnaire with Likert scale which has four multiple choice. It was developed according to validation process by 3 experts, which were 1 physics lecture as physicist, 1 phychology lecture who expert in questioning skill, and 1 physics teacher. It was arranged using 2 indicators of teachers questioning skill and it was the development result which is have been used by Uno [22]. According to the assessment from 3 validators, it can be concluded that the instrument is ready for field test. All sections of trial test have been conducted for 64 students in one of Senior High School in Banda Aceh to test validity and reliability. Technique for validity and reliability instrument refers to method which is had been used by previous researchers [23]. The trial test showed that the instrument has good score for reliability and validity (0.90 and 0.25). The research was done by distributing questionnaire of questioning skill for students when the teacher conducted the learning process for one meeting. Then, the data were analyzed using descriptive statistics with percentage.

3. Result and discussion
3.1 Analysis for teacher questioning skill
According to analysis for the whole result on the component of basic questioning skill and advanced questioning skill, the percentage of average score for teacher achievement of questioning skill in learning physics can be seen in Figure 1.
Based on Figure 1, the teachers questioning skill in learning physics was categorized by good achievement for RU (79.13%), IR (76.78%), and SU (76.52%). Then, the skill categorized with pretty good is obtained by NI (74.71%), BA (75.58%), and SY (67.79%). The analysis for six teachers especially for SU and BA, they did not have good ability in distributing questions, but it was provided for the whole class, hence it caused the students can not be participated well. The result is in line with Ermasari [24] who explained that the uneffectivity of teachers questioning skill are shown by the question distribution which is not evenly, providing response which is not good and the teachers habits who directly answered the question asked by teachers.

According to Figure 1, it also result that the teachers still not optimal for advanced questioning component because of quation type which is submitted by teachers on low level which is memorizing question, understanding and applied question. As for, the type of question used by teachers in submitting questions in physics learning can be seen in Table 1.

### Table 1. Question forms submitted by teachers in physics learning

| Teacher | Question forms submitted by teachers in physics learning |
|---------|----------------------------------------------------------|
| SY      | (what is the conclusion form conducted experiment?)      |
|         | (what is differences between acceleration and deceleration?) |
| NI      | (what is your impression to the existence of electricity?) |
|         | (who is famous scientist declared about static electricity?) |
| RU      | (what thing that can be attracted by magnet?)             |
|         | (what is differences between conduction and convection?)  |
| BA      | (what is static fluids?)                                 |
| IR      | (why the woods can be floated on the water surface?)      |

Based on Table 1, it obtained that generally teachers used question type with word “what” by category for memorizing (C1). Only one teacher (E) who provide question “why”. The result showed that the teachers still not able to submit higher order question in order to facilitate the development of students higher order thinking skill in learning process [19]. Besides that, category of different question type will encourage reflection and build students knowledge [26].
3.2 The influence of teaching experience to the questioning skill

3.2.1 Basic questioning skill
The influence of teaching experience to the basic questioning skill can be seen in Figure 2.

![Figure 2. The Influence of Teaching Experience to the Basic Questioning Skill](image)

Information of Indicators:
(1) Disclosure the questions clearly and concisely
(2) Giving references
(3) Centralization towards the requested answer
(4) Replacement turn replied
(5) Spreading questions
(6) Giving time for thinking
(7) Giving guidelines

According to Figure 2 the influence of teaching experience only exist on indicators of spreading questions, giving references and giving guidelines. From the video observation, it obtained that SU and BA were more success on indicators of giving references with helping the students who feel difficult to answer the questions. This finding proved that basically attitude change which is showed by students must be influenced by educational background and teachers experience [22].

3.2.2 Advanced questioning skill
The influence of teaching experience to the advanced questioning skill will be shown in Figure 3.

![Figure 3. The Influence of Teaching Experience to the Advanced Questioning Skill](image)

Information of indicators:
(1) Changing the demands of cognitive level of the questions
(2) Question chronology
(3) Giving questions for tracking
(4) Encourage the interaction among students
According to Figure 3, there is the influence of teaching experience on indicators (2) questions chronology and (4) encourage the interaction among students. It means the more experience obtained by teacher in teaching, so it will create questioning skill regularly and be able to motivate students for doing the interaction among them. Based on the graph in Figure 3, it can be understood that the addition of teaching experience will decrease the ability in figuring out the students capabilities. The result of video observation obtained by SY, NI, RU, SU, and BA used question chronology by starting comprehension questions and then will be closed by applied question through question problem solving. This finding showed that the teachers who have many experiences will be able to provide higher order questions with cognitive chronology appropriated to the questions [13].

4. Conclusion
The result of teachers questioning skill in physics learning in several state senior high school in Banda Aceh is presented by percentage of 75.04% with pretty good category with basic questioning skill by percentage of 76.37% (good) and advanced questioning skill by percentage of 73.83% (pretty good). Other than that, this research indicated that the influence of teaching experience will be reached on the components of advanced questioning skill based on questions asked.

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