The kinds of questions asked by novice teachers in learning mathematics

L Zahra*, T A Kusmayadi and B Usodo
Mathematics Education Department, Universitas Sebelas Maret, Surakarta, Indonesia

*Corresponding author: labibazahra@gmail.com

Abstract. This study describes the kinds of questions asked by novice teachers during mathematics learning process in senior high school. This study used descriptive analysis. The subjects of this study were two novice teachers who teach mathematics in 10th grade. The result showed that the frequently asked questions by novice teachers based on the objective were compliance questions, rhetorical questions and sometimes prompting questions and probing questions. The frequently questions asked by novice teacher based on the cognitive process dimension of Revised Bloom’s Taxonomy were questions of remembering, questions of understanding, questions of applying, questions of analyzing and questions of evaluating. The novice teachers asked the routine questions which had same thinking level. The question with the highest level of thinking did not asked by the novice teachers.

1. Introduction
Being a teacher is not sufficient by having the knowledge skill in their field, but it also required to have the teaching skills. One of the skills that must be mastered is the questioning skill, which stimulates and grows the student responses so that their critical and creative thinking will develop [1]. Brualdi stated that in order to teach well, a teacher must be able to question well along with good questions so that students are able to interact with their teacher effectively [2]. Just as Brown and Edmondson defined that "Questions in the classroom are statements intended to obtain oral responses“ [3]. Wragg and Brown's study report stated that a teacher spends one to two minutes to ask the questions [4]. Beside, Critelli suggested that there are several variations of methods to increase student participation in the class, the most important one is by asking questions [5]. Asking questions is one of the most frequent teaching techniques done by teachers. Therefore, Callahan and Clarke argued that the question is one of the most important of all teaching techniques [6]. The question is one sign of one's involvement in learning and critical thinking [7]. The quality of question is reviewed from the different kinds of questions that asked by the teachers [8].

However, sometimes teachers asked questions that are less stimulating the critical thinking process. Beside that, some teachers just ask brief questions [9]. The study of questioning skill conducted by Moyer shown that teacher need more education training to teach mathematics skill [10]. Brickhouse said, "the level of experience can make a teacher appreciate science“ [11]. Barizi argued that educational background and teaching experience are two aspects that affect the professionalism of a teacher in education and teaching [12].
Most of novice teachers often feel unprepared for challenges in their early years of teaching [13]. The study of Asada shown that the novice teachers need more time for mentoring to pass the teaching challenges [14]. Bartel said, the most critical problem that encounter in teaching practice by novice teacher are adapting themselves in the real situation, managing students from different background and language barrier [15]. The other things, novice teachers tended to reflect upon their teaching activities, such as their methods and skill [16]. The research conducted by McAnnich concluded that the novice teachers were lack of experience in teaching so that their questioning skills were not properly done [17]. Supported by Ong research (2010) which stated that the novice teachers still ask routine questions focusing on procedures and final answers [18]. The other research that supports the statement is Widodo's research (2006) which conducted in four junior high schools in Bandung. It was stated that most of the questions asked by novice teachers are brief questions that require simple answers, memorization and comprehension [19]. During learning process, there are many kinds of questions. This study used 2 kinds of questions. First, questions based on the objective. Second, questions based on cognitive process dimension of Revised Bloom’s Taxonomy.

2. Methods
This study is a descriptive qualitative research which describe the kinds of questions asked by novice mathematics teachers. The kinds of questions consist of the questions based on objective [20] and the questions based on cognitive process dimension of Revised Bloom’s Taxonomy [21]. The main subjects were two novice mathematics teachers from Senior High School in Probolinggo Regency whose teaching experience are less than 4 years [17].

The data were collected by passive participation observation and a semi-structured interview. The data analysis was inductive analysis based on the data obtained, then developed into hypotheses. The fourth observations result of each teacher was triangulated. The triangulation results were validated with the interview result which will be used as research temporary result. The temporary result then were member- checked to the related subjects to improve the validity of the data so that the conclusion in corresponding to the data source [22].

3. Result and Discussion
The kinds of questions asked by the novice teachers were obtained from their teaching process during mathematics learning. Based on its kind, the data showing the questions asked by the novice teachers can be seen in the Table 1.

| Table 1. Result of the kinds of questions asked by novice teacher based on the objective |
|-----------------------------------------------|
| Learning Process | Subject 1 | Subject 2 |
| Preliminary Activity | Compliance Question | Compliance Questions |
| T : “Before we continue to the next material, is there any question about the last material?” | T : “As usual, is any questions, comments or opinion about material last week?” |
| S : “No, sir.” | S : (No answer) |
| Main Activity | Compliance Question | Compliance Question |
| T : “Is there any other opinion? Do you have the same idea or not? (No answer) How about Dita’s group?” | T : “A = 30° and B = 45°. Then write it based on the formula. Who want to try it?” |
| S : “It’s the same, sir.” | S : (No answer) |
| Rhetorical Question | Prompting Question |
| T : “Pay attention on x axis, Please! If the equation $y = x^2 - 3x - 10$, is it true the factor $(x - 5)(x - 3)$? (No answer) | T : “If we write something like this, $\frac{1}{\sqrt{2}} = \sqrt{2}$ what does it means?” |
Learning Process | Subject 1 | Subject 2
---|---|---
Probing Questions | T : “Okay, for example, Ani throws the dice once. How many sides of one dice?” S : “six sides.” T : “Please, mention the sample space!” S : “n(s) = {1, 2, 3, 4, 5, 6}” | S : (No answer) T : “Wait, who have $\frac{1}{4}$? Is it only $\sqrt{6}$ or $\sqrt{2}$ too?” S : “Both of them, sir.” T : “So, how do we write it?” S : “Give them brackets.” T : “Which one should be given the brackets?” S : “The root, sir.” T : “Please, write it correctly!” S : (one of the student rewrite $\frac{1}{4}(\sqrt{6} - \sqrt{2})$) “Isn’t it, Sir?” T : “Another opinion?” S : “Same, sir.”
Closing Activity | - | -

Table 1 shows the kinds of questions based on the objective. The questions often asked by novice teachers on the preliminary activity were the questions that asking students to do something related to the material and motivate students to be active during the learning process. It could be interpreted that the questions asked on preliminary activity were to request students to be active during the learning process. Therefore, it could be seen the questions that often asked by the novice teachers were compliance questions [20]. At the main activity, the novice teacher asked the questions that requesting students to do something related to the materials which were being taught. It could be interpreted that the questions were to encourage students to be more active during the learning activity and to provide information to students (compliance questions) [20]. The teachers also asked the questions where the answers were replied by the teacher. The questions were used to give the information to students about the material (rethorical questions) [20]. Sometimes, the teachers asked the questions that could direct the thinking process of the students toward the materials. This questions were used to guide the thinking process of the students more step by step (prompting questions) [20]. The motivation for students to learn more about the material was barely seen. It means tha the questions were used to give motivation to the students to learn more the material (probing question) [20]. Therefore, it could be seen that in the main activity, the the frequently asked question by asked the novice teachers were compliance questions and rhetorical questions. Sometimes the teacher asked prompting questions and probing questions too [20]. Based on the research result, it was shown that there are no questions based on the objective asked during closing activity because the teachers almost used the whole subject time for the main activity.

Table 2. Result of kinds of questions asked by the novice teachers based on the cognitive process dimension of revised bloom’s taxonomy

| Learning Process        | Subject 1                                      | Subject 2                                      |
|-------------------------|------------------------------------------------|------------------------------------------------|
| Preliminary Activity    | Question of Remembering                        | Questions of Remembering                       |
| T : “Today we are discussing probability. Is there any one know the explanation of intersection?” S : (No answer) | T : “Let’s continue the subject. Today we will discuss the addition of cosine. What is the formula of $\cos (A + B)$? (No answer). Read your book, please! Mention the |
The kinds of questions asked by the novice teacher based on the cognitive dimension process of Revised Bloom’s Taxonomy. At the preliminary activity, the novice teachers often asked questions about the material that the students use to restate the material from the previous learning. It could be interpreted that the questions will make the students to maximize their ability to recall and review the information that has been obtained from the previous learning. Therefore it could be seen that the questions that frequently asked in the preliminary activity belong to questions of remembering [21]. In the main activity, the questions asked based on the cognitive dimension process of Revised Bloom's Taxonomy were the questions that allows the student to use their ability to recall their knowledge in long-term memory. It means that the kinds of questions made the students maximize the ability to recover the relevant knowledge from long-term memory (questions of remembering) [21]. The teachers also asked questions that make students use their ability to understand the material. It could be interpreted that the questions build the meaning of the learning message and be able to communicate it both written and orally (questions of understanding) [21]. In addition, teachers asked the questions that enable students to use their ability to solve problems using their own procedures. The question shows that the teacher made the students use the procedure to solve the problem (questions of applying) [21]. There are the questions that enable students to use their ability to find the relation between the statements to become related entities. This question made the students solve the unity into sections and discover how the parts are linked to each other and perform assessment based on certain standards (questions of analyzing) [21]. And also, the questions asked by the teachers were the typical questions stimulating students to use their ability to examine, assess and criticize the opinions or ideas of other students (questions of evaluating) [21]. As the result, it could be seen that the kinds of questions asked

| Learning Process | Subject 1                                      | Subject 2                                      |
|------------------|-----------------------------------------------|-----------------------------------------------|
| Question of Remembering T: “Who want to try it? (No answer).” | “Cos (A + B) = Cos A · Cos B – Sin A · Sin B.” |
| Question of Understanding T: “A ∪ B = {2, 3, 4, 5, 6}. A ∩ B = {2}. Then, can you calculate the probability of the dice less than five? Mention it!” | S: “Cos (A + B) = Cos A · Cos B – Sin A · Sin B.” |
| Question of Analyzing T: “Jesika’s group, why n(s) minus 3?” | S: “Because each group is taken one.” |
| Question of Evaluating T: “Eko’s group, give your opinion, please!” | S: “It’s the same sir.” |
| Question of Applying T: “Okay, let’s try to solve this question. Given A = 30° and B = 45°. Then, Cos (30° + 45°) is? Try it, you can just use the formula.” | S: “Yes, sir.” |
| Question of Analyzing T: “So, the answer is 1/2(√6 – √2). Then, how about Cos (A – B). What is the different?” | S: “The sign sir. Use plus.” |
| Question of Evaluating T: “Cos (30° + 45°) = Cos 30° · Cos 45° – Sin 30° · Sin 45°, is it right?” | S: “Yes, sir.” |
by the novice teachers based on the cognitive dimension process of Revised Bloom's Taxonomy at the main activity were the questions of remembering, questions of understanding, questions of applying, question of analyzing and also questions of evaluating [21]. Table 2. also shows that there are no question based on cognitive dimension process of Revised Bloom’s Taxonomy asked during closing activity, since the teacher maximizes the main activity until the end of the subject time.

This discussion shown that the questions asked by the novice teacher in mathematics are routine questions. There are no different kinds of questions in the other days. The questions had the same thinking level, such as the questions based on cognitive process dimension of Revised Bloom’s Taxonomy. The novice teachers only asked the questions of remembering, understanding, applying, analyzing and also evaluating. The creating questions were not asked even once. The creating question is the highest level in thinking. Therefore, the novice teachers needed to improve their questioning skills so that they can ask creating questions to support student’s higher levels of thinking [23].

4. Conclusion
Based on the discussion above, it can be concluded that the questions based on the objective asked by the novice teachers at the preliminary activity is compliance questions. At the main activity, the teacher asked compliance questions, rhetorical questions, prompting questions and probing questions. But, at the closing activity there are no questions. The kinds of questions based on the cognitive dimension process of Revised Bloom’s Taxonomy that asked by the novice teacher at the preliminary activity is only questions of remembering. In the main activity, the novice teachers asked the questions of remembering, understanding, evaluating, and applying. The analyzing questions were rarely asked by the novice teacher. In the closing activity, teachers did not ask questions at all. Since the kinds of questions asked by novice teacher are related to the routine questions, it is important to develop the novice teachers’ knowledge and skills in questioning.

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