An Analysis of Cognitive Types and Levels of Questions Posed by the English Teachers by Using Hess’ Cognitive Rigor Matrix

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Abstract: The purpose of this study was to find out the cognitive types and levels of questions that were posed by four English teachers at Senior High School I Padang Panjang during different phases of teaching reading. The cognitive types and levels of questions were determined by the criteria which were established by Hess through the combination of The Bloom's Cognitive Taxonomy and The Depth of Knowledge named Hess’ Cognitive Rigor Matrix. Result from this study show that the majority of the teachers’ posed questions were low in cognitive types and levels. The cognitive types and levels of questions required the students to perform primarily at the basic level of remembering and understanding.

Keywords: Teachers’ Questions, Teaching Reading, Hess’ Cognitive Rigor Matrix, Question Types and Levels

1. Introduction

Researches that are discussed about teachers’ questions in classroom situation have been conducted more since the benefit of the questions is well known by both researchers and the teachers. That is about 70% of teacher behavior is noted in the form of asking question [1]. According to [2] the teachers in their study asked in the frequency of 300-400 questions each day.

To all English language skills that were taught to the Senior High School students, question is crucial to give positive effect in order to promote students’ level of thinking. For teaching reading skill -English as a foreign language- to students in Indonesia, K-13 curriculum of Indonesia states that the main goal of learning English for High School students is expected them to be able to access more information after they graduate from the High School. The intention could be fundamentally built by posing cognitive types and levels of questions during teaching reading by the teachers. All of the knowledge result from questions and asking question is the most important intellectual tool said by Hess [3].

Questions which are posed by the teachers are facilitated through the texts that are being taught during the teaching and learning process. Instead of posing questions about topic, main idea, vocabulary, grammatical structure of the text a lot to the students, the questions should be collaborated with questions that ask the students for making connection, tracking down important information, inferring/predicting, visualizing, evaluating and synthesizing according to [4]. Teachers’ posed questions usually use to introduce various reading activities and to deliver the new reading passages. The teachers may, for instance pose questions to students to compare, differentiate, define and paraphrase. The variation of teachers’ questions should be able to direct the students to use their knowledge to the new situation, creating example and sharing information. All of the students’ opportunities will be highly affected by the questions posed by the teachers. The teachers have responsibility to create questions that can promote their higher level thinking rather than just asking them to find out the grammatical feature of the reading passages.

The issue about teachers’ posed questions during teaching reading is still being discussed by many teachers or researchers in many different field of studies. The international article that was written by [5] entitled “7 Ways Teachers Get Questioning Wrong” states several common problems in questioning techniques which are made by teachers. The problem are no wait time, using students’ name, leading questions, vague questions, lower level questions, affirmative statement as questions and imprecise questions. Of those seven common problems, five problems are close to what teachers ask during the teaching and learning process. Research about teachers’ questions during teaching reading that was conducted by [6] showed a result that 79 % of the questions were in lower questions. The questions fell into recall, comprehension and application questions. Another result of teacher question research showed that 20% of the teachers’ questions belonged to recall question which also fell into lower question based on the Teaching Excellent in Adult Literacy in 2013. In the 1997, a result of the research that was conducted by [7] about teachers’ questions showed that 91% of the teachers’ questions were low order questions. Moreover, [8] conducted the research about the English teachers’ questions in reading. The result of that study concluded that the questions which were posed by the teachers were 80 % in low thinking level. Although the studies used different instruments to find out the types of teachers’ posed questions, the result showed that most of the teachers’ posed questions were low level questions. Those findings were got from various categories of teachers’ questions type and purposes.

In Indonesia, there have been some researches about English teachers’ posed questions during classroom teaching. [9] at one of Senior High School in Gowa found that the dominant questions which were posed by the English teachers were opened/closed questions and display questions. In addition, [10] did a research about teachers questions during classroom teaching that used Richard and Lackhart category
to find the types of questions. This study which was conducted in Mojokerto found that convergent, divergent and procedural questions were more frequently posed by the teachers. And [11] which used Bloom Cognitive Taxonomy as the criteria found that knowledge question was the dominant posed question while synthesis question was hardly asked by the teachers. Those findings represented the questions which were posed by the English teachers during classroom teaching. In Indonesia, although some studies are conducted to find out the types of teachers’ questions during classroom teaching, there is a deth of teachers’ questions in EFL reading classroom. [12] conducted a research about teachers’ questions in reading activities to find the types which were analyzed with Richards and Lockhart category and the purpose of teachers’ questions which were analyzed by Long and Sato category. Although this study analyzed the teachers’ questions during reading activities, the findings seems general to whether the questions were in the cognitive or non cognitive question.

2. Review of Literature

2.1. Levels of Questions

In the general classification, there are two level of questions; low- level question and high-level question. [13] and [14] say that low-level questions are questions which require students to remember, reiterate or find information that is within the text. Moreover, [13] says that although low-level, intext questions are easier to generate, teachers must ask questions from a variety of levels to ensure student achievement. These types of questions do not encourage students to use high-level thinking, but rather require them to just recall what they have read or learned in a manner which produces a correct or incorrect response according to [13] and [15]. Research studies show that low-level questions are the easiest for teachers to produce and, therefore, are the most common form of questioning in the classroom. [13]. [15] mention that although low-level questioning may not prepare students to think deeply, they do, however, set the stage for making sure students are ready for higher-level discussion.

High-level questions, although most infrequently used, are extremely beneficial for student learning. High-level questions are questions which require students to analyze, synthesize, evaluate, categorize or apply what they have read explain by [13] and [14]. In other study done separately by [13] and [16], they both agree that high-level questions frequently do not have one correct answer, but rather encourage students to produce a response which is unique to their thinking and interpretation of the text. In addition, [17] tells that research has shown that asking higher-level thinking questions is fundamental to student learning. Besides, teachers who emphasized higher-level thinking through the asking of higher-level questions promoted greater reading growth in their students [17].

Based on the explanation given by the experts above, they are all agree that low level question and high level question are common in classroom question delivered by the teachers. Although [13] says low level question are in text question, and also proved by [14] that says the low level question just guide the students to remember and reiterate the info in the text, [15] highlight that the set of low level question will prepare the students ready for higher level discussion. When the students are asked the high level question, it will impact to their growth in learning especially for discussion. So, both level of questions; low level and high level question would be seen in this study because those questions give impact to the student learning process as well as prepare the students to the level of thinking expected in the university level.

2.2. The Bloom's Cognitive Taxonomy

In line with the statement of the government, the focus of teaching reading for students of senior high schools is to train students to get the meaning of the texts and to get more detail information from the reading activity. In other words, reading comprehension is the main focus for the Senior High School students. In a process of teaching and learning reading, questions may play an important role. Questions lead students to the comprehension. [18] state that well-designed questions help students interact with the text create and construct meaning and begin to think critically and intelligently. Questions are any statements which need to be answered. They help students focus on the case and recall what is being known by the students. For example, a study conducted by [19] was identifying questions through Bloom's taxonomy offering various kinds of levels of thinking. This study proved that questions could be a means of activating and training the students’ level of thinking. Bloom's taxonomy offers six levels of thinking namely Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. According to [20], these categories of cognitive domain are hierarchically arranged which means that the achievement of a lower category is the prerequisite to the higher ones. The idea of Bloom’s taxonomy was revised in 2001, [20]. The changes were on the terms used and the new concepts of two-dimensional cognitive domain. The two-dimensional cognitive domain offers an idea that the students’ level of thinking covers not only the thinking process but also the kinds of knowledge.

Based on this taxonomy, each level of knowledge can correspond to each level of cognitive process. In the revised Bloom’s taxonomy, the cognitive processes are presented as verbs and the knowledge content are presented as nouns. The each level is dependent upon the learner’s ability to perform at the level preceding it. The teacher’s challenge is to encourage students to master their current level and to move on to the next. This taxonomy is the the basic work used by the researcher to categorize each question into its certain level in the depth of knowledge.

2.3. Webb's Depth of Knowledge

Webb's Depth of Knowledge (DOK) is a scaled cognitive demand (thinking) design created to align standards with assessment. Based on the research of [21], this document defines the highest DOK level for each core content standard for state assessments and guides item development for the assessment [22]. Webb's DOK has four levels (Level 1, Level 2, Level 3 and Level 4). Each level is defined specifically for the content areas of language arts, math,
science, and social studies. Because this study concentrated on the different phases of teaching reading, the descriptors were given for the language arts levels of DOK.

2.4. Hess’ Cognitive Rigor Matrix

[23] study how to merge Bloom’s Taxonomy with Webb’s Depth of Knowledge and create a matrix that reflects cognitive rigor. They studied teachers as they worked in professional learning communities and documented specific events where teachers struggled somewhat in planning for questions. The teachers in the study discovered that Bloom’s Taxonomy offered inadequate guidance in conveying instructional strategies and also found that there was not a natural tie between the taxonomy levels and the depth of understanding required to respond. These teachers also found that many of Bloom’s verbs such as compare and explain were used frequently at various levels of the taxonomy. The teachers were able to understand how Webb’s Depth of Knowledge assisted in lesson planning and found that designing DOK Level 3 and Level 4 activities required the students to converse with one another for an extended time and were therefore more engaged with the content. These teachers found that the students required more wait time when questions were posed and that the students were better able to express conceptual understanding. The teachers agreed that DOK Level 3 and Level 4 activities required their students to learn in more depth than previously expected.

3. Related Researches

There are some researchers who have conducted some researches about the use of questions in the language skills. [24] researched about teachers’ questions in SMUN 1 Padang. She found that Wh- questions and interpretation questions could direct students to stimulate thinking, understanding the text, encourage students’ critical thinking and creativity based on their background knowledge.

The topic of this research is not totally the same with the research proposed by this study. The study conducted by [24] Endriani was dominated by the propounded words to see the stimulation given through the Wh-Questions. The intention of the her study is quite the same with this proposed study which the intention to see the improvement of student critical thinking.

[25] analyzed level of questions in class discussion that are asked by the third year English Department Students at State University of Padang and the ability of the students in asking questions. The result indicated that only two levels of questions that were used by the students from the six types of questions offered by Bloom. It showed that 52, 4% of the questions were first level, and 46, 7% of the questions were second level. Beside that, [25] was analyzed about level of questions that were used by the students in class discussion. It means that questioning skills were used in speaking activity.

The study conducted by [25] shows the different grade with this conducted research. She studied the development of student thinking based on Bloom Taxonomy in speaking skill in university. The finding of the research could be one basic view of the level of question in the university level. Both of the intention in these two researches remains the same that is to promote student higher level thinking.

[26] conducted about whether the improvement of teachers’ questions can enhance the students’ critical thinking. There were several factors should be considered: opportunities occur for both low and high levels of cognitive experiences, the writing-to-learn questionnaire leads to clear and succinct responses, and the teacher should prepare a series of open-ended and probing discussion questions.

The research conducted by [26] is quite similar to this conducted research in the focus of promoting student critical thinking. And the engagement is also the similarity appear for both. So, this could then become the comparison to see the improvement of student level of thinking in different language skill.

Based on the finding from the previous researches, some teachers do not realize that they have used questioning skills to the students in teaching and learning process. In reading activities, the teachers usually give some questions that indirectly train the students to increase their level of thinking to the higher one. So this study is attempted at analyzing kinds of teachers’ questions, function of the teachers’ questions and the teachers’ follow-up questions, the students’ responses appear during three reading phases in teaching reading.

4. Methodology

4.1. Type of the Research

The research was a mixed method research. This study combined the quantitative and qualitative data together without setting down one data primarily than another data. [27] mentioned that the mixed method research is a research design with philosophical assumptions as well as of inquiry. This research was the sequential method (Sequential Transformative Method) which encompasses qualitative then quantitative then followed by qualitative. This research involved collecting, analyzing and interpreting the data that investigated the same underlying on; what are the the cognitive level question and the functions posed by the teachers and the reasons those questions posed more to the students or the reason why some other questions ignored by the teachers.

4.2. Participant of the Research

The participant of this research was four English teachers at Senior High School. The disproportionate stratified random sampling was used as a selected sampling method because according to [28] disproportionate stratified sampling is a stratified sampling procedure in which the number of elements sampled from each stratum is not proportional to their representation in the total population.
4.3. Duration of the Study

This study was conducted on May 2015. It involved seven time observations to the four teachers. Each teacher was observed two times and each observation was recorded during the 90 minutes of teaching reading.

4.4. Research Instrument and Data Analysis

The instrument of this research was observation. The use of audio material supported the instrument to avoid missing real condition. The data observation of this study were the questions posed by the English teachers during teaching reading in pre-reading, while-reading and post-reading. The observation data of this study were first reduced to get the cognitive types and levels of questions then the cognitive types and levels of teachers’ questions were tabulated. From the tabulation, the data were displayed through the histogram to see the mode for each type and level of questions. And the last step was conclusion drawing.

5. Discussion

Based on the study that was related to the cognitive types and levels of questions that were posed by the English teachers during different phases of teaching reading using Hess’ Cognitive Rigor Matrix, it was found that the U/DOK 1, U/DOK 2 and R/DOK 1 cognitive types and levels of questions were frequently posed during different phases of teaching reading in this study. These three cognitive types and levels of questions; in the Hess’ Cognitive Rigor Matrix are placed as the lower cognitive types and levels of questions. [29] said that this does not mean the lower cognitive types and levels of questions should not be asked. This research finding just show the clear indication that when teaching reading through texts, the English teachers at SMA 1 Padang Panjang did not facilitate enough the students with the higher cognitive types and levels of questions. [29] also mentioned that it is appropriate to ask questions to address all cognitive types and levels of questions. As a the result, the students’ capability to think beyond the texts was not seen enough in this study. In connect to the Pharm’s idea, the finding of this research states that the cognitive types and levels of questions which the F teacher posed to the students could determine a better start to promote the students level of thinking.

Based on the cognitive types and levels of questions that were posed by the teachers which were analyzed with Hess’ Cognitive Rigor Matrix, it came to the indication that accordingly the number of orally posed questions was low for all four teacher observations in this study. While [2] found that the teachers in their study posed between 300-400 questions each day, almost all of the teachers in [2] study posed 100 questions within 90 minutes. The number of questions posed regardless of their cognitive level ranged from 50 to 100 during 90 minute to all reading phases.

The four teachers in this study were well aware they were being observed in order to document their orally posed questions. Historically, research indicates that the number of questions the teachers posed to students in a given day is not large. [1] stated that as much as 70% of teacher behaviour is exhibited in the form of asking questions.

Moreover, [29] research finding was supported by [30], he found in his research that quite a number of research studies have found higher cognitive questions superior to lower one, many have found the opposite and still others have found no difference. Another study [31] stated that unfortunately, observation of classroom has repeatedly shown that lower cognitive level questions are far from frequently used.

[6] found in her research entitled “English Teachers’ Question in Vietnamese High School Reading Classroom” that lower cognitive questions was much higher that higher questions which the 79% of lower cognitive level question and 21% of higher level questions. The higher number of the lower cognitive level question found in her study was to easier the students answering the posed question. This indicated that the teachers gave an effort to elaborate the higher level questions but the response was lower that what the teacher expected. As a consequence, the solution taken was lowered the prepared higher cognitive level questions. [32] said that the teachers exposed mainly to low-level questions. This frequent low posed questions was asked by the teacher with the different reason with [6]. [32] stated that the teachers on her study faced challenges in generating higher level questions.

The two researches above proved this study that in the teaching reading through texts, the higher number of lower level questions is still dominant to various researches in posed questions in teaching reading. The reasons seemed vary to one and another.

6. Conclusion

Based on the result of this research, the researcher could note some conclusions as stated below:

1) From the total number of questions which were posed by the teachers; a large portion of them fell into the cognitive types and levels of questions which were placed low in the matrix. Remembering type of cognitive question which has only one level was noted more in the observation of M 2 and M 3 teachers while the understanding type of cognitive question which has 4 levels was noted more in the observation of M 2 and F teachers. Instead of cognitive types and level of questions, there were also numerous non cognitive questions which were posed by the teachers. These questions were asked to guide behaviour, procedural or those that required students to agree with the teachers’ comment. These questions were posed more by the M 1 teachers in the social class students in order to direct their attention during teaching and learning process.

2) The remembering and understanding types and levels of questions which were place lower in the matrix were frequently posed by the teachers because they were able to keep the students’ participation in class, to control the students’ answers. Since the answers of those questions were easy to find, the number of participating students would also high. The other reasons were related to the text types and the teachers’ knowledge about some
cognitive types and levels of questions which were placed higher in the matrix.

3) Some higher cognitive questions were posed minimally by the teacher. This action happened because firstly the time given for teaching text was only 90 minutes. The teachers said that there should be more time needed to pose higher level questions as well as the large number of the students too in participating to share their opinion to the questions. The other result of this limited meeting also gave impact to the purpose of teaching reading itself. The reading which were related to questions turned into writing because of the time. The second reason was related to the types of text given in the teaching reading. There was a misconception when the teaching of song text for reading skill. The domination of listening activity in teaching the song text for reading in this study impact to the questions given during the different phases of teaching reading.

References


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ebb's%20ppt.pdf


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