



## Investigating Learning Questions Used in SMA Negeri 5 Kota Bukittinggi: A Cognitive Level Analysis

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### Abstract

*This study aims to find out the distribution of cognitive levels on questions used for learning in SMA Negeri 5 Kota Bukittinggi. Additionally, the findings of LOTS and HOTS questions proposed for learning in SMA Negeri 5 Kota Bukittinggi are analyzed and then described. The analysis in this study is based on Revised Bloom's Taxonomy. The informants of the research are 3 English Teachers who teach in grade X, XI and XII. To answer all questions, a descriptive research is conducted to describe the result of the research. The results of the study show that there are significant imbalances in the distribution of different level of questions during the learning process. In most cases, the teachers across all grades are more inclined to propose LOTS-based questions than its HOTS counterpart. Specifically, this research found that remembering (C1) and understanding (C2) level of questions dominated the distribution of questions in SMA Negeri 5 Bukittinggi with the combined overall percentage of more than 50%. Despite this, there was a pattern of increase in the percentage of HOTS questions as the grade increases. Grade XII shows higher percentage of HOTS-based questions compared to the other grades. However, the percentage of HOTS-based questions given in learning is found to be higher than LOTS questions.*

### Keywords:

cognitive levels, lower-order questions, higher-order questions

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## INTRODUCTION

Questions are one of the fundamental tools to elevate students' thinking. According to Gattis (2002), question serves important roles in guiding and extending students' learning. Therefore, it is really essential to guarantee the quality of the questions involved based on the standard given. In order to ensure the goals are clearly comprehended, a framework is needed to identify the quality of the questions

used which is then can be categorized in the cognitive domains of Revised Bloom's Taxonomy. There are two levels of thinking that can be found in the cognitive domains, Higher Order Thinking Skills (HOTS) and Lower Order Thinking Skills (LOTS).

In the 21st century, Higher Order Thinking Skills (HOTS) play a significant role in problem solving for an individual (Brookhart, n.d.; Moseley & Dkk, 2006; Thompson, 2008). Goodson & Rohani, (2012) defines a high-level thinking skills (HOTS) as a critical, logical, reflective, metacognitive, and creative thinking skills. These capabilities will be activated and developed when an individual encounter new circumstances, phenomenon, unfamiliar matters which requires problem solvings that never been done previously.

Moreover, Aschner (Gail, 1984), stated that asking questions is one of the ways to stimulates students' thinking. As the result, questions that are used for learning should reflect students' critical thinking. For this reason, there must be congruence between questions used in the classroom interactions and classroom assessments specifically in the English as a Foreign Language (EFL) subject.

In the process of learning, questions serve as the tool to parameterize the progress of students' understanding. Adler (1982) stated teachers pose questions in order to engage and encourage more in-depth level thinking related to the topic at hand. It means that teacher's questions functioned in order to trigger students' creativity and critical thinking. Throughout the learning process, the teacher implements several strategies that contribute to the success of the classroom interaction. Questioning strategies can be acquired as a means of introducing the HOTS concept in a spoken form alongside worksheet questions given by the teacher in written form as part of the learning process.

In the matter of educational standard, Curriculum plays as a fundamental guidance in succeeding educational goals. As the national parameter, curriculum needs to be gradually reformed through times in order to fulfill the society needs. Indonesia has made improvements to the assessment standards pertaining to critical and analytical thinking through the Ministry of Education and Culture. In micro scale, assessment conducted by teachers is expected to be able to improve students' higher order thinking skills (HOTS).

Several studies have been carried out with regard to Higher Order Thinking Skills (HOTS) questions in learning (K. Ahmad, 2018; Wiyaka, Prastikawati, Prabowo, & Adi, 2020; Zainil & Rosa, 2020; Zaiturrahmi, Kasim, & Zulfikar, 2017). They found out about the teachers' incapability to implement HOTS properly where LOTS-based questions dominated the classroom interaction. It can be concluded that HOTS in Indonesia's education system is still needed to be developed in regard of its implementation and the factors that influenced students' critical thinking. The previous researches mostly focus on HOTS-based questions analysis found in learning process through classroom interactions. However, the congruence between oral and written assessments involved during the learning process have not yet under discussion. Therefore, the researcher attempted to scrutinize the distribution of cognitive levels on questions used for learning in SMA Negeri 5 Kota Bukittinggi.

## RESEARCH METHOD

This study was a descriptive-comparative research. According to Gay (1992), descriptive research entails gathering information to test hypotheses or answer questions about the current state of the research subject. This type of research is chosen because the researcher wants to describe the distribution of Lower Order Thinking Skills and Higher Order Thinking Skills based-questions within learning in SMA Negeri 5 Kota Bukittinggi. However, quantitative calculation (e.g. how many words or phrases show HOTS imperative) used to support and justify the result of the analysis since a descriptive research determines and reports the way things are.

The data in this research are all questions used during the whole learning process. The source of this research data is primer data which directly taken from informants through observation and documents analysis. Informants in this research were the English Teachers in SMA Negeri 5 Kota Bukittinggi who taught in grade X, XI, and XII. In gaining the data, researcher used recording and documents analysis. In conducting this research, there were several tools in supporting this research namely camera to record the observation process, documents of questions used for learning in SMA Negeri 5 Kota Bukittinggi consisted of students' worksheets, exercises, daily assessments, and the checklist format to identify the distribution of levels of questions used within six categories of Revised Bloom's Taxonomy. The indicators in checklist format are stated in the following table.

**Table 2. Indicators of cognitive domain in Taxonomy Bloom Revision**

<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>C5</b>	<b>C6</b>
<b>(Remember)</b>	<b>(Understand)</b>	<b>(Apply)</b>	<b>(Analyze)</b>	<b>(Evaluate)</b>	<b>(Create)</b>
Mention	Classify	Choose	Examine	Summarize	Assemble
Imitate	Describe	Demonstrate	Contrast	Criticize	Change
List	Explain	Arrange	Distinguish	Validate	Facilitate
Find	Compare	Illustrate	Separate	Enclose	Create
Repeat	Translate	Interpret	Test	Determine	Design
Pronounce	Paraphrased	Use	Edit	Clarify	Establish
State	Elaborate	Modify	Detail	Assess	Write
Sign	Match	Valuated	Select	Defend	Formulate

(Adapted by: Anderson, L.W & Krathwohl, D.R.:2001)

The data is collected through two mechanisms followed by each steps. Firstly, for observation, researcher visited the school directly, prepared all tools needed,

observed and recorded the classroom interactions by not neglecting details activities to be noted and later to be converted into transcriptions. Secondly, for the document analysis, researcher collected the data in the form of transcriptions, students' exercises, students' worksheets, and daily test to be analysed later on. Generally, in the context of categorizing, integrating, and evaluating data, researcher must be systematic (Gay, 2009). The process of data analysis are conducted based on the three stages. Firstly, reading and identifying the data from video recording based on classroom interactions were converted into transcriptions. Researcher analyzed and scrutinized the data result from transcriptions and document analysis used Revised Bloom's Taxonomy in the form of checklist table to classify the data based on six categories consist of LOTS and HOTS. Then, the data were classified based on Revised Bloom's Taxonomy categories by checklist format. Secondly, displaying the data to calculate the result based on their categories to gain the data distributions, frequencies, and percentages. The relevant collected data were quantified in the form of percentages. The percentage of accuracy is used Bungin's formula (Bungin, 2006). Thirdly, drawing conclusion based on the results obtained by describing the relevant collected data to get the understanding about the research findings.

**RESULT AND DISCUSSION**

*Research Finding*

**The Distribution of Questions for Learning within Cognitive Domains Proposed by Teachers in SMA Negeri 5 Kota Bukittinggi**

In this part, the data were collected from the questions involved in the learning process from classroom interactions, students' worksheets, and even exercises. The data analysis were done based on Revised Bloom's Taxonomy to scrutinize the distribution of both levels of thinking within the questions. According to Anderson and Krathwohl (Wilson & Ed, 2016), Lower Order Thinking Skills (LOTS) level starts from: remembering (C1), understanding (C2), and applying (C3). Then, Higher Order Thinking Skills level (HOTS) are: analyzing (C4), evaluating (C5), and creating (C6). After conducting data analysis, it is found that remembering (C1) is the most dominant questions proposed by teachers during learning process with 83 questions. From the result of data analysis, it is found that level of questions constructed by teachers in learning process is elaborated as below.

**Table 1. Findings of Distribution of Levels of Questions Proposed by Teachers for Learning**

NO.	Levels of Questions	Revised Bloom's Taxonomy	Grades / Teachers			Total
			X	XI	XII	
			A	B	C	
1.	LOTS (Lower Order	Remembering (C1)	46 (42.99%)	33 (35.11%)	4 (16.67%)	83 (36.89%)
		Understanding (C2)	42 (39.25%)	32 (34.04%)	5 (20.83%)	79 (35.11%)

	Thinking Skills)	Applying (C3)	5 (4.67%)	2 (2.13%)	0 (0%)	7 (3.11%)
2.	HOTS (Higher Order Thinking Skills)	Analyzing (C4)	11 (10.28%)	18 (19.15%)	4 (16.67%)	33 (14.67%)
		Evaluating (C5)	1 (0.93%)	4 (4.26%)	7 (29.17%)	12 (5.33%)
		Creating (C6)	2 (1.87%)	5 (5.32%)	4 (16.67%)	11 (4.89%)
<b>Total</b>			107 (47.56%)	94 (41.78%)	24 (10.67%)	225 (100%)

Table 1 shows the number of questions proposed by teachers from grade X until XII during the learning process in percent form. Overall, it can be seen that the distribution of questions were dominated by the questions for Lower Order Thinking Skills (LOTS), which account for around three-quarters of the total questions. Among the 6 cognitive levels, the questions classified as Remembering (C1) was the most prevalent level of questions asked by teachers in SMA Negeri 5 Kota Bukittinggi during the learning process, which is 36.89%. Understanding (C2) questions were second after C1 questions with around 35.11% of the total questions, whereas Applying (C3) questions were the least-asked level of questions with only 3.11% of the total questions. In contrast, the questions for Higher Order Thinking Skills (HOTS) accounted only for around 25% of the total questions. Among them, the analyzing (C4) questions were the one with the highest percentage, i.e., 14.67%. In Table 1, it can also be noticed that the amount of questions asked in learning decreases as the grade increases. The grade XII questions was just a small minority compared to those of grade X and XI that had a total percentage of almost 90%. Considering the unequal amount of questions asked by the teachers in different grades, the distribution of questions comparison between grades must be done in percentage.

Teacher A and teacher B proposed 107 and 94 questions during the learning process respectively. Despite the different percentages obtained in each cognitive levels, the first-highest and second-highest percentage for both grades are of the same levels, with remembering (C1) being the former and understanding (C2) being the latter. These two account for more than 50% of the total questions, which imply the dominance of LOTS questions in the learning process of grade X and XI. The similarity between both grades continues only up to the third-highest percentage, which is the analyzing (C4) category. As for the remaining levels of questions, the distributions are different in its ranking. The rarest questions asked by teacher A during learning were those of evaluating (C5) category, which is an insignificant minority of 0.93%, whereas the least-asked questions by teacher B were those of applying (C3) category with the percentage of 2.13%.

Meanwhile in grade XII, there were only 24 questions proposed by Teacher C within the learning process. In contrast to other grades, the distribution of questions in Grade XII is more dominated by HOTS questions. This domination can also be seen from the percentage of questions classified as evaluating (C5) level, i.e.,

29.17%. However, the next commonly asked questions is still from LOTS questions, namely understanding (C2) level questions. The rest of the cognitive levels, whose percentages are 16.67%, were equally distributed with the exception of applying (C3) level question that wasn't asked in learning at all.

In conclusion, the data have revealed the variation in the distribution of questions across the three grades. The distributions in grade X and grade XI were partly similar considering only C1, C2, and C4 category that were positioned in the same ranking. Additionally, grade XI and grade XII were alike to a certain extent, since the rarest questions asked by teacher B and teacher C belonged to the applying (C3) category.

**Table 2. Findings of Distribution of LOTS and HOTS Questions for Learning in SMA Negeri 5 Kota Bukittinggi**

NO	Grade	LOTS		HOTS		Total
		F	%	F	%	
1.	X	93	86.92%	14	13.08%	107
2.	XI	67	71.28%	27	28.72%	94
3.	XII	9	37.5%	15	62.5%	24
<b>Total</b>		<b>169</b>	<b>75.11%</b>	<b>56</b>	<b>24.89%</b>	<b>225</b>

Table 2 displays the percentages of LOTS and HOTS questions proposed by teachers for learning. There were 225 questions proposed by teachers from three grades, 107 questions were asked in grade X, 94 questions were asked in grade XI, and 24 questions in grade XII. Overall, the questions proposed by teachers in the learning process were dominated by LOTS with 169 questions, followed by HOTS with 56 questions. Furthermore, based on the results found in data analysis, the frequency of LOTS questions involved in the learning process across all grades is more than 50%, i.e., 75.11%. This means more than half of the total questions proposed in the learning process are of LOTS category. On the other side, the frequency of HOTS questions found in the learning process is only 24.89% or approximately a quarter of the total questions. The most distinctive result is shown in grade XII with the percentages of HOTS-based questions is 62.5%. This result has significant gap compared to the percentages of HOTS questions in grade X and grade XI, which are 13.08% and 28.72% respectively. From the results, it can be concluded that most teachers in SMA Negeri 5 Kota Bukittinggi were more inclined to give LOTS-based questions instead of HOTS-based questions during the learning process. To be specific, Figure 1 illustrates the percentage of LOTS and HOTS questions proposed by teachers for learning in SMA Negeri 5 Kota Bukittinggi.

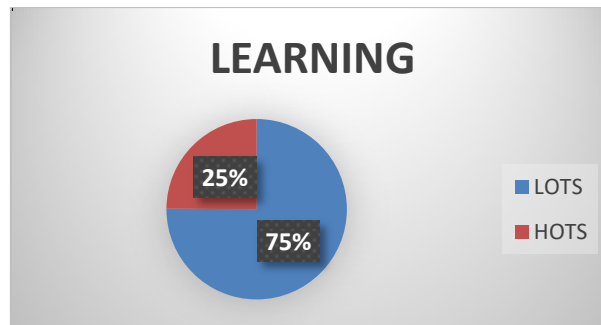
**Figure 1. LOTS and HOTS Questions Proposed by Teachers for Learning**

Figure 1 displays the total percentage of LOTS and HOTS questions proposed in learning within grade X, XI, and XII. It is shown that Lower Order Thinking Skills (LOTS) were found to be dominant for classroom assessments. As seen in the figure, 75% (75.11% to be precise) of questions in learning are in LOTS level while the remaining 25% (24.89% to be precise) of the questions are classified as HOTS level.

### ***Discussion***

This research aims to find out the distributions of questions proposed by teachers for learning in SMA Negeri 5 Kota Bukittinggi. The findings of the research revealed that the teachers proposed Lower Order Thinking Skills questions significantly more than the Higher Order Thinking Skills questions. In this discussion, the distribution of questions in learning is analyzed by arranging the level of thinking based on the percentage of questions of that particular level.

The distribution of questions in learning for grade X is the first topic of discussion. The results of the findings show that remembering (C1) and understanding (C2) were the two levels of questions that have the highest percentages in the learning of grade X. The former accounts for 42.99% of the total questions, whereas the latter accounts for 39.25% of the total questions. By referring to the data found, it can be noticed that the topic covered in the meeting, worksheets, exercises, and daily assessments of grade X was related to advertisement. The questions for this topic tend to ask students to answer simple questions whose answers can be easily found from the given text or poster. For instance, the questions might ask the students to identify the target customers of the ad, or the cost of the product/service advertised. The simplicity and shortness of most ads might be the reasons why in this case evaluating (C5) level of questions had the lowest percentage in the question distribution, which was only 0.93% of the total questions. Considering the nature of this topic, the reasons behind the domination of C1 and C2 can somewhat be understood.

Next, the distribution of questions in learning for grade XI was partly similar to grade X. Both grades were dominated by C1 and C2 level of questions, and then followed by analyzing (C4) level of questions as the level with the third-highest percentage. Unlike grade X, the level of questions with the lowest percentage in grade XI was applying (C3) which has the percentage of 2.13%. Additionally, the percentage difference between LOTS-based and HOTS-based questions, i.e.,

42.55%, was also smaller than that of grade X, i.e., 73.83%. The reduction in percentage difference means that there were some increments in the questions classified as C4, C5, and C6 level. One of the reason for this might be due to the topic of narrative text learned in grade XI. The sufficient length and complexity of the story in high school narrative text allow the teachers to ask students many questions that require more analysis and evaluation to answer. For instance, the question regarding a story's moral message, which is classified as C5 level of questions, encourages students to develop opinions and make judgement about the issues told in the text. Other examples like rearranging jumbled sentences, or choosing the best title for the story can also be used to sharpen the students' ability. Nevertheless, the finding of this research shows the inclination of the teacher to give LOTS-based questions, such as the simple 5W1H questions that only require C1 or C2 level of thinking, for the topic about narrative text.

In contrast to the previous grades, the distribution of questions in learning for grade XII was dominated by HOTS-based questions. The finding shows that evaluating (C5) level of questions had the highest number of questions with the percentage of 29.17%. However, the second most common level of questions asked was understanding (C2) which accounts for 20.83% of the total questions. Additionally, the rest of the cognitive levels, whose percentages are 16.67%, were equally distributed with the exception of applying (C3) level of question that wasn't asked in learning at all. The biggest factor that influenced this finding might be due to the topic of argumentative text taught in grade XII. In order to further understand the possible factors that influenced the findings, this discussion are going to utilize and relate the results of other researchers to the findings in SMA Negeri 5 Bukittinggi. These other research data will also be used to complement the point made in this discussion.

## **CONCLUSION AND SUGGESTIONS**

The level of questions constructed by teachers for learning in SMA Negeri 5 Kota Bukittinggi is still at lower-order levels. It implies that the questions were dominated by lower-order questions (LOTS). In the learning process, the level of questions constructed by teachers for learning in SMA Negeri 5 Kota Bukittinggi overall were dominated by the questions for Lower Order Thinking Skills (LOTS), which account for around three-quarters of the total questions. Among the 6 cognitive levels, the questions classified as Remembering (C1) was the most prevalent level of questions, which is 36.89%. Understanding (C2) questions were second after C1 questions with around 35.11% of the total questions, whereas Applying (C3) questions were the least-asked level of questions with only 3.11% of the total questions. In contrast, the questions for Higher Order Thinking Skills (HOTS) accounted only for around 25% of the total questions. Among them, the analyzing (C4) questions were the one with the highest percentage, i.e., 14.67%. In short, the data have revealed the variation in the distribution of questions across the three grades. The distributions in grade X and grade XI were partly similar considering only C1, C2, and C4 category that were positioned in the same ranking. Additionally, grade XI and grade XII were alike to a certain extent, since the rarest questions asked by teacher B and teacher C belonged to the applying (C3) category.



This study is primarily scrutinized the distribution of levels of questions used for learning in SMA Negeri 5 Kota Bukittinggi. However, it still has a number of restriction. This study only compared the levels of questions used for learning aspects in one specific area. Thus, to obtain a more comprehensive study result, a deeper research in many other schools is necessary. Furthermore, it is suggested that the future researcher will study the factors that influence the implementation of cognitive levels from both teacher and students' perspective to gain better understanding and hopefully encourage further researcher to develop HOTS-based model learning for the sake of expected result.

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