

## **An Investigation of the Frequency of HOT and LOT of Bloom Taxonomy in the Diploma English Entrance Exam\***

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**Abstract:** This study investigated the implementation of *Ujian Khas Bahasa Inggeris* as the entrance examination for Diploma in English candidates in one of the local universities in Malaysia. It was conducted with the intention to evaluate the suitability of the test paper with its purpose. This test paper measures the candidates' proficiency in the English language using grammar and vocabulary items, reading comprehension items and essay writing. For this study, the researchers focused on only vocabulary, grammar and reading comprehension items. Educators use Bloom Taxonomy to determine the difficulty level of the items when constructing test papers; so for this study, the taxonomy is also used to establish the level of difficulty of the items. The Form 5 syllabus of the English Language was used to help in determining the items' difficulty in the entrance test by referring to the specifications of level for the learning outcomes. The researchers looked at the order of the items in the entry test, to see if the items were arranged from the easiest to the most difficult. The percentages for the Lower Order Thinking (LOT) and Higher Order Thinking (HOT) items and the ratio of the easy, medium and difficult items were calculated. The findings showed that some of the items in the entrance examination need to be revised to ensure the reliability of the instruments in measuring the candidates' language proficiency.

**Note:**

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**Keywords:** Bloom Taxonomy, Lower Order Thinking (LOT), Higher Order Thinking (HOT), Entrance Exam, English Proficiency.

## INTRODUCTION

Assessment is done to gain artifacts on the language ability and to look at how proficient a student is (Coombe, et al., 2007) in mastering a skill or measuring the competency. This study scrutinizes how *Ujian Khas Bahasa Inggeris* fulfils the purpose as the entrance exam for the Diploma in English course. The suitability of the test for selecting and the predictive validity of the results yielded for the enrolment of the Diploma in English course must not be taken for granted. Students with lower scores will be refused admission even if their English results in *Sijil Pelajaran Malaysia* (SPM) is B+ or higher.

Grammar, vocabulary and comprehension items used in the entrance examination were analyzed in this study; the entrance exam encompasses writing test and also an interview. The percentages of HOT and LOT questions were calculated and these percentages are compared to the English Language Syllabus used in public schools. Some of the students selected for the course do not perform well in their diploma and thus the need to review the items in the entrance examination.

The analysis of the paper is conducted to investigate whether the items used and the content tested in the entrance examination are taught in schools. This study aims to answer the following questions:

1. What is the percentage of the easy and difficult questions for grammar items?
2. What is the percentage of easy, medium and difficult questions for comprehension items?

The findings of these questions will be discussed with reference to the suitability of the items to be used in the entrance examination.

## **Significance of the Study**

The needs for revising the items in the entrance examination are equally important as other entry requirements. This is to ensure those who are selected meet all the requirements and are suitable for the course. This is also to ensure that the candidates have the appropriate level of proficiency in the English Language to complete their diploma. This study will verify the quality of the items based on HOT and LOT, and the effectiveness of the test items in providing accurate insights of the candidates' English language proficiency.

## **LITERATURE REVIEW**

The needs for conducting and having to sit for a test for education and employment purposes are dated back about 300 years ago (Cheng, 2005; in Melor Md Yunus and Hadi Salehi, 2012) and tests have served various purposes including selection. Many issues were raised about the *Ujian Khas Bahasa Inggeris*, as the entrance examination, as the aim of this test is to test the proficiency of the candidates. Arshad Abd. Samad (2010) claims that testing grammar is more of testing the candidates' knowledge of the language, and this questions the inclusion of grammar items in the *Ujian Khas Bahasa Inggeris* as its purpose is to gain the insights of candidates' proficiency. The inclusion of grammar items in the entrance exam may not serve the purpose of the test. The main purpose of a good test is to gain useful data (Friedenberg, 1995; in Cardoso, 1998) to be used in determining future and its planning, thus *Ujian Khas Bahasa Inggeris* may not provide the required data to measure proficiency.

## **Proficiency Test**

Proficiency tests act as tools to gain data on the ability of the candidates of different levels to use the language (Coombe, et. al., 2007). This includes how the language is used in different settings as well as the delivery of the message in the target

language. Unlike Criterion-Based Test, *Ujian Khas Bahasa Inggris* for the Diploma in English programme is a Norm-Referenced Test where the candidates' score will be used as the measure to determine their proficiency. This is because the result of the test determines which students should be accepted for the enrolment (Coombe, et. al., 2007) to the course. Therefore, the need for preparing accurate and good items in *Ujian Khas Bahasa Inggris* as a proficiency test is vital in predicting future achievement (Prapphal, 1990; in Taher Alavi, 2012) of the students.

### Testing Grammar

Testing grammar here means measuring the candidates' knowledge of the English language grammar. Since knowledge of grammar is factual knowledge, grammar items need low level of thinking (Anderson, et. al., 2001; in Gezer, et. al., 2014) to arrive at the correct answer; knowledge level in Bloom Taxonomy. In a communicative syllabus, the need of communicating with proper grammar is given less focus but the focus is given to the delivery of the message (Dávid, 2007). Since *Ujian Khas Bahasa Inggris* is a proficiency test, the inclusion of grammar items may impede the purpose of to measure proficiency.

In addition to testing grammar in proficiency test, Dávid (2007) discusses the appropriateness of using multiple choice questions to test grammar. He added that using multiple choice questions requires good skill in preparing the stems and the options to avoid "giveaway" which will reduce the reliability of the result. Due to the big number of candidates, multiple-choice questions are used in examination as it assists the scoring. Therefore, many institutions and test constructors have overlooked this matter. Nevertheless, this study will not put an emphasis on the construction and the development of the items but only to the level of difficulty of the items.

Another concern found when the researchers review the literature is multitrak items which increase the difficulty of the format of the items rather than the degree of difficulty of the questions. Items with less difficult format have greater

validity than those with high level of difficulty of format (Dávid, 2007). Multittrak items, is said to be more difficult than other formats, require candidates to identify errors in the stimulus which is seen as only be suitable in training English language teachers and not as proficiency test (Dávid, 2007).

## **Testing Reading Comprehension and Vocabulary**

The items for reading comprehension must be arranged according to the hierarchy of difficulty (Luebke & Lorié, 2013) which is from LOT to HOT. In testing reading comprehension, lower-order thinking is said to ask questions on which the answers are easily found by extracting them from the text whereby the higher order thinking questions require candidates to find answers that cannot simply be recollected (Renaud & Murray, 2007). The items as well should be brief and concise (Rayment, 2006) and other measures are to be considered such as the length and the complexity of the passage as well as the grammatical structure (Arshad Abd. Samad, 2010).

The inclusion of reading comprehension items in *Ujian Khas Bahasa Inggeris* would be necessary to test proficiency. This is because it tests the candidates' ability to receive the message in the target language as a receptive skill (Melor Md Yunos & Hadi Salehi, 2007). Reading comprehension texts must be from authentic materials where the candidates' proficiency in reading is tested optimally when they have the prior knowledge of the topic (Cardoso, 1998) rather than making a new discovery of the subject matter.

## **Bloom Taxonomy and Thinking Skills**

Bloom Taxonomy can be used to structure questions (Shaunessy, 2000; in Gezer, et. al, 2014) thus, this study was conducted with close reference to the taxonomy. Bloom Taxonomy is also used for assessment of the student behaviours (Bloom, et. al., 1956; in Seaman 2011) and this study will determine the level of cognitive behavior of the candidates in using the language. Even though the taxonomy

has undergone revisions, educators are free to choose either the original version or the revised versions to be used as evaluation device (Seaman, 2011).

The comparison of LOT and HOT are based on the levels in Bloom Taxonomy where LOT comprises the first three levels of the taxonomy which are knowledge, comprehension and application, and the HOT comprises of analysis, synthesis and evaluation (Seaman, 2011). Anderson et. al. (2001; in Luebke & Lorié, 2013) suggested that the first three levels of taxonomy which knowledge, comprehension and application are hierarchal and the other three are at par. Higher-order thinking questions are said to be useful to stimulate candidates' thinking skill (Gezer, et. al., 2014) and hence, it will help to determine how well the candidates use the language to deliver the thoughts.

According to Jideani and Jideani (2012), the LOT and HOT are two different orders of cognitive skills, where LOT covers the knowledge and comprehension aspects in cognition, whereas HOT includes application, analysis, synthesis and evaluation where these cognitive aspects have more profound depth and difficulty (1993: and Crowe et al. 2008). In the work by Bloom (1956), which is quoted by Deal and Hedge (2013), the classification of cognitive skills were done in such a way that it progresses from the '...simple and concrete...', which refers to characteristics of LOT to something that is more '...complex and abstract...' in HOT.

## **METHODOLOGY**

This study is a qualitative study with the analysis of the document. This study concerns only with the suitability of the items in the test papers to be used as the entrance exam for Diploma in English course. The documents which were analyzed were the question paper as well as the table of test specification.

The question paper is divided into two parts. The first part is the grammar items for questions 1 to 30, and the second part is the comprehension and vocabulary which are from question 31 to 50. For grammar items, the calculation of the percentage of lower-order thinking (LOT) questions

and higher-order thinking (HOT) questions is done with the reference to form 1 to form 5 syllabi (*Huraian Sukatan Pelajaran*). The significance of the reference to the *Huraian Sukatan Pelajaran* is to determine the background knowledge of the candidates. The ratio of the LOT and HOT will determine the quality of the test paper and the suitability of these items to be used in entrance exam as proficiency test.

Comprehension and vocabulary items were analyzed individually with the reference to Bloom's Taxonomy; whereby Level I is at par with knowledge and comprehension, Level II is on par with application and analysis, and Level III is at par with synthesis and evaluation level in the taxonomy.

## FINDINGS

### Grammar Items Analysis

Section A contains 30 questions and all questions are grammar based. 30 marks were allocated for this section.

**Table 1** Number of easy and difficult questions

Types of questions	Number of questions
Easy (LOT)	18
Difficult (HOT)	12
Total	30

As can be seen in Table 1, there are 18 easy questions and 12 difficult questions. As stated by Anderson, et al., (2001; in Gezer, et. al., 2014) the grammar items are low level as they require only knowledge of the grammar rules. Therefore, it can be said that it only involves the first two levels of Bloom's Taxonomy which are remember (recall) and knowledge (understand). The other twelve questions are considered difficult as they involve analysis of the situation before selecting the answer. For instance, there are questions on conditionals; whereby an analysis of the situation must be done before selection of answers. This study also found that

conditionals are not taught in school as it is not included in the syllabus. The question paper also involves error analysis; the candidates have to identify the errors in the given sentence. This question is considered as higher order thinking question as this requires students to evaluate the sentences.

## **Reading Comprehension and Vocabulary Items Analysis**

Section B contains two reading passages, where 20 marks were allocated for this section. There are 20 questions, with 10 questions for each of the passage. In Table B, we could see the sequence of questions with the cognitive levels being tested. In Bloom's Taxonomy, the lowest cognitive level is knowledge, followed by comprehension, application, analysis, synthesis and the highest level of cognition is evaluation.

For Passage 1, Questions 31 to 35 test students' comprehension of the text read. Questions 36 and 37 test students' ability to synthesise information. Question 38 tests the students' comprehension. Question 39 tests the students' ability to apply knowledge in a different situation, whereas Question 40 assesses students' ability to synthesise information. It could be seen that the sequence of questions are not progressing from the lowest level of cognition to the highest. As mentioned earlier, Question 38 is a comprehension level question. Therefore, Question 38 is not in the correct order of difficulty level; it should contain an item that tests students at the synthesis level. Similarly, for Question 39, it is also not in the correct order of difficulty, where it tests students' ability to apply their knowledge in a new situation. Question 39 should also test students' higher level of cognition which is synthesis or evaluation.

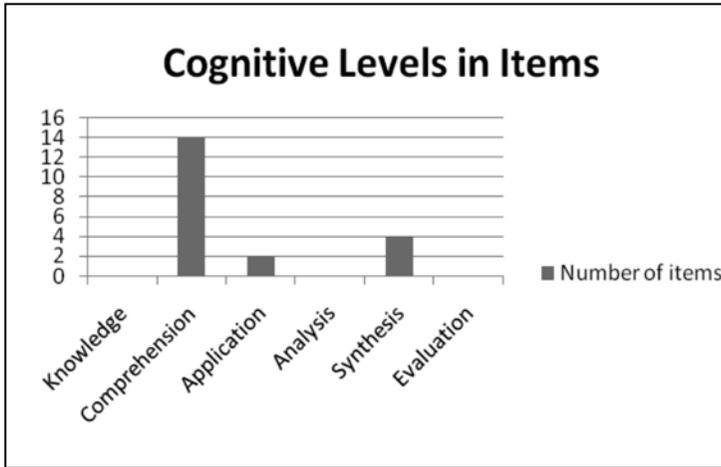
For Passage 2, from Table B, we could see that Questions 41, 43, 44, 45, 46, 47 and 48 all test students at the comprehension level. Question 42 tests students' application level of cognition. Questions 49 and 50 test students' ability to synthesise information. As shown in Table B, we could

see that Question 42 is not conforming to the sequence of difficulty levels of cognition, because Question 41 and Question 43 both are comprehension questions.

**Table 2** Level of Question Difficulty according to Bloom's Taxonomy.

Question number	Level (Bloom's taxonomy)	Paragraph (P)
<b>Passage 1</b>		
31	Comprehension (scan)	P1
32	Comprehension (scan)	P2
33	Comprehension (scan)	P4
34	Comprehension (scan)	P3
35	Comprehension (infer)	-
36	Synthesis (summarise)	-
37	Synthesis (formulate)	P2
38	Comprehension (infer)	P4
39	Application (predict)	P4
40	Synthesis (summarise)	-
<b>Passage 2</b>		
41	Comprehension (identify)	P1
42	Application (apply)	P1
43	Comprehension (locate)	P2
44	Comprehension (infer)	P2
45	Comprehension (identify)	P3
46	Comprehension (identify)	P3
47	Comprehension (paraphrase)	P3
48	Comprehension (recognize)	P3
49	Synthesis (formulate)	P3
50	Synthesis (summarise)	-
<b>Total of comprehension level questions = 14</b> <b>Total of application level questions = 2</b> <b>Total of synthesis level questions = 4</b>		
<b>Total of questions = 20</b>		

Looking at Figure 1 below, it could be seen that the majority of the questions used in the reading texts are from the comprehension level of cognition. This is followed by four synthesis questions and two application questions.



**Figure 1** Types and Number of Cognitive Levels Tested

From Table 3, it can be seen that for Passage 1, there are seven LOTS questions and three HOTS questions. On the other hand, Passage 2 contains eight LOTS questions and two HOTS questions. As mentioned by Luebke and Lorié (2013), the sequence of the difficulty of items should be from the easiest to the most difficult, or it could be said that the sequence of questions should be from LOTS to HOTS. As we can see from Passage 1, questions 31 until 35, and questions 38 and 39 fall under the LOTS category, and questions 36, 37 and 40 are under the HOTS category. Looking at Passage 2, the order of questions is as the following: questions 41 until 48 are in the LOTS category and questions 49 and 50 are HOTS questions. Therefore, the order of questions in Passage 1 does not fulfil what has been stated by Luebke and Lorié (2013), but the sequence of questions in Passage 2 follows what has been stated by them.

**Table 3** Categories of Questions

Question number	HOTS/LOTS	
Passage 1		
31	LOTS	Number of LOTS questions = 7
32	LOTS	
33	LOTS	
34	LOTS	
35	LOTS	Number of HOTS questions = 3
36	HOTS	
37	HOTS	
38	LOTS	
39	LOTS	
40	HOTS	
Passage 2		
41	LOTS	Number of LOTS questions = 8
42	LOTS	
43	LOTS	
44	LOTS	Number of HOTS questions = 2
45	LOTS	
46	LOTS	
47	LOTS	
48	LOTS	
49	HOTS	
50	HOTS	

When the questions in the two reading passages are categorized into LOT and HOT, the two categories are illustrated in Table 4 as shown below:

**Table 4** Number and Percentage of LOT and HOT Questions

Order of Thinking	Number of questions	Percentage (%)
LOT	15	75.0
HOT	5	25.0
Total	20	100.0

For the reading comprehension section, there are 20 questions. Out of the 20 questions, there are 15 LOTS questions and 5 questions in the HOTS category. Therefore, more than half (75%) of the questions are LOTS questions and 25.0% are HOTS questions.

## CONCLUSION

It can be concluded that the grammar items are not appropriate to be concluded since it is proficiency test and not measuring students' knowledge on the language (Arshad Abd. Samad, 2010). Although the ratio of easy to medium items are considered as balanced, this study concluded that grammar items should not be included in the *Ujian Khas Bahasa Inggeris*. Meanwhile, the comprehension and vocabulary questions were not sequenced according to the hierarchy from easy to difficult. In terms of ratio, this study found that the ratio of HOT and LOT is acceptable as this is a proficiency test. There is a need for the inclusion of reading comprehension and vocabulary items because of the need to measure proficiency. This study also concluded that comprehension and vocabulary items need to be revised for future use. For further research, it is suggested that item analysis is done to see the level of difficulty of each item.

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