# An Analytic Study on Cognitive Levels of Reading Comprehension Questions through Revised Bloom's Taxonomy

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## Abstract

*The aim of this research is to investigate and analyze English reading comprehension questions of the third year course at MIIT using revised Bloom's taxonomy. Generally, English language questions are categorized into four main sections: reading, vocabulary, grammar and writing. Of these, reading comprehension questions are focused on this paper to explore which cognitive levels are more set in these questions based on revised Bloom's taxonomy. So, all the reading comprehension questions of the third year English course at MIIT for five semesters from the academic year (2017-2018) to (2019-2020) are collected.* Then, *the data are analyzed and the frequencies and percentages of the existence of the students' critical thinking skills from the reading comprehension questions are calculated. The results indicate that 70.27% of reading instructions are in LOTS and 29.23% in HOTS. Although the cognitive levels from the reading comprehension questions are using many more LOTS than HOTS questions, they can provide students to arouse their critical thinking skills. It is hoped that the present study would be useful for English Language teachers to be able to analyze and set questions that can extend over students' critical thinking skills aligned with their language levels.*

***Keywords:*** Bloom's taxonomy, cognitive levels, LOTS, HOTS

## 1. Introduction

In the 21st century, Bloom's taxonomy acts as a significant guideline in assessing students' cognitive levels. To promote students' critical thinking skills, teachers need to set questions that can polish their students' cognitive levels. It is also a means of measuring quality improvement in the continuous learning. According to Husprub (2014), educational evaluation reflects the quality of education in each country to ensure one's educational quality. Exam results can also serve as an index of their effectiveness in learning.

In the conventional Myanmar teaching context, knowledge acquisition has been emphasized, rather than knowledge creation and application. In the 21st century, the assessment moves toward the use of more analytical and critical thinking skills. According to Brown (2003), teaching, assessments and tests are not separated and interrelated to each other. In order to identify the levels of critical thinking skills of their students in their assessments or tests, many teachers set their questions based on Bloom's taxonomy 1956 and Bloom's revised taxonomy 2001.

In this research, therefore, revised Bloom's taxonomy was used as a framework to classify cognitive levels of students for reading comprehension questions. The analysis of such study aims at exploring to which extent of the reading comprehension questions of the third year English course at MIIT refer to the levels of Bloom's taxonomy.

## 2. Literature Review

Thinking process is indeed critical for mental health, high achievement, and professional success. Students should be motivated to give opinion about what they read, to analyze materials, to form creative ideas and to evaluate. Therefore, it is important to set questions that can extend over students' critical thinking skills. Reading comprehension questions are classified based on revised Bloom's taxonomy to assess students' critical thinking skills aligned with their courses.

### 2.1. Theoretical Background

Bloom's taxonomy is a system to classify the different levels of thinking, learning and understanding. The taxonomy was created by Benjamin Bloom, an educational psychologist at the University of Chicago in 1956. It contains three hierarchical models: cognitive domain (knowledge-based), affective domain (emotion-based) and psychomotor domain (action-based). Among three domains, the cognitive domain is the highest importance in the traditional education and is frequently applied to contrast curriculum learning objectives, assessments and activities. In the original version, the cognitive domain contains six levels of Bloom's taxonomy: knowledge, comprehension, application, analysis, synthesis and evaluation (from lower to higher order cognitive skills). Later. The taxonomy was revised by Lorin Aderson and Kythwohol in 2001. In the updated version, the cognitive processes are presented as verbs, instead of nouns and the three categories were renamed; knowledge became remembering, comprehension was made as *understanding* and *synthesis* was changed to *creating*. In addition, *creating* was switched into highest level, taking the place of *evaluating*. Therefore, in the revised version of the cognitive domain, it became *remembering, understanding, applying, analyzing,*

*evaluating, creating* (from lower to higher order cognitive skills). These six levels are used to structure learning objectives, lesson plans and assessments of the course. Bloom's taxonomy is employed as a framework to organize a continuum of special educational needs and to increase critical thinking skills. It can make a teacher easier to assess one's understanding and to identify weak areas. The levels of cognitive process are shown in figure-1.

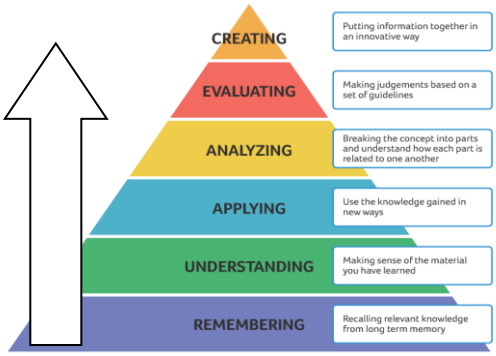


**Figure 1. Bloom's Taxonomy - Cognitive Domain**

*Remember:* Bring back to one's mind a fact, piece of information etc…, from long-term memory.
*Understand:* Realize the meaning of words, how or why something happens, how it works or why it is important.
*Apply:* Use something or make something work in a particular situation.
*Analyze:* Examine the nature or structure of something, especially by separating it into its parts in order to understand or explain it.
*Evaluate*: Draw conclusions from examining; to assess; express an opinion of something after thinking about it carefully.
*Create:* Make a new process or act that did not exist before, especially something that shows ability or imagination.

## 2.2. Related Researches

The new Myanmar educational policies move into integrated critical thinking skills and challenging opportunities. In implementing this policy, the framework of Bloom's taxonomy is used for examining the depth of cognitive process level in educational objectives. Kaung Myat San, University of Yangon (2019) used Bloom's taxonomy to assess cognitive thinking skill levels demanded in reading activities in the Coursebook Global A2+. In the same year, Thi Thi Tun, Mawlamyine University (2019) analyzed reading sections in English Unlimited B1+ Intermediate Coursebook using Bloom's revised taxonomy. Similarly, Dincay Koksal and Omer Gokhan Ulum, Cannakkale Onsekiz Mart University, Turkey (2018) investigated exam questions based on the levels of Bloom's taxonomy with frequencies and percentages. The results of their research indicated that there was still predominance of lower level thinking questions in the textbooks. Their analyses focus on calculating whether or not exam questions for general English Courses at universities cover the lower and higher order cognitive levels of Bloom's taxonomy. Based on these researches, the current study was carried out to investigate if cognitive levels of Bloom's taxonomy in the reading comprehension questions of the third year course at MIIT cover the lower and higher order cognitive levels of Bloom's taxonomy.

## 2.3. Data Analysis and Results

A good and reasonable examination paper must contain disparate difficult tasks or activities to provide different critical thinking skill levels of students. In addition to that reading is a fundamental means to get knowledge. It is found in difficulty to be read between the lines to get underlying meanings and intensions of the writer. Therefore, reading comprehension is the core of the teaching/learning process in all disciplines. Teachers can make use of a taxonomy to classify questions used to assess cognitive levels of students into classes to align their courses. As in need in the assessment of the student's cognitive levels, all the reading comprehension questions of the third year English course at MIIT for five semesters from the academic year (2017-2018) to (2019-2020) are collected and analyzed using revised Bloom's taxonomy. The group of taxonomy consists of lower and higher order cognitive levels categorized into remember, understand, apply, analyze, evaluate, create. Some reading comprehension questions are exemplified with the cognitive levels of revised Bloom's taxonomy.

**Table 1. Analysis of the Cognitive Process Level**

| No | Instruction | Thinking Level |
|---|---|---|
| 1. | Fill in the blanks with the correct words to summarize the passage. | B |
| 2. | Why do you think grey squirrels are regarded as pest? | E |
| 3. | Who do you think are 'the smaller cousins' mentioned in paragraph two? Why are they called so? | D<br>E |
| 4. | Have you ever heard Birdy? If so, do you like her music? Write in about 6-8 lines why you like or don't like her music. Explain your reasons properly? | A<br>D<br>F |
| 5. | Think of a friend or family member who is good (or very good) at music, art, sports, or in any other field. Write a short biography (200-250 words) of her/him. Use the | A |

| | | |
|---|---|---|
| | following questions and prompts to write your answer. | C |
| 6. | What is the main idea of the article? | B |
| 7. | What are the main problems faced by the Internet addiction? | B |
| 8. | What suggestion do you have for internet 'de-addiction'? | F |
| 9. | What is the USP (Unique Selling Point) of Hasbean Coffee? | A |
| 10. | How did Joyride Coffee' make an impact when it entered coffee business? How is it different from other brands? | B<br><br>D |

***NB:*** *A=Remember D=Analyze*

*B=Understand E=Evaluate*

*C=Apply F=Create*

With regards to the levels of cognitive domain in reading comprehension exam questions, the result (overall frequency and percentage) is presented in the following table (Table-2). The purpose of this study is to determine to which extent exam questions are successful in measuring high-level thinking process.

**Table 2. Percentage of Cognitive Level**

| Level of Questions | Frequency | Percentage |
|---|---|---|
| Create | 4 | 5.41 |
| Evaluate | 10 | 13.51 |
| Analyze | 8 | 10.81 |
| **Total HOTS** | **22** | **29.73** |
| Apply | 6 | 8.11 |
| Understand | 35 | 47.30 |
| Remember | 11 | 14.86 |
| **Total LOTS** | **52** | **70.27** |
| **Total Instructions** | **74** | **100** |

Table 2 represents that the frequencies and percentages of cognitive levels students have to handle the instructions in reading comprehension exam questions of the Third Year English Course at MIIT. There are 74 total number of instructions which are classified according to the cognitive process levels of Bloom's taxonomy. Out of 74, the frequency of *Understanding* is the most with 35 (47.30%) and *Creating* is the least with the frequency 4 (5.41%). The second most frequency *is Remembering* with 11 (14.86%) and the third is *Evaluating* with 10 (13.51%), and then *Analyzing* and *Applying* are followed with 8 (10.81%) and 6 (8.11%). The overall finding of this analysis is that *Understanding* level of thinking skills is frequently found in exam papers while other five levels are rarely or alternatively found.

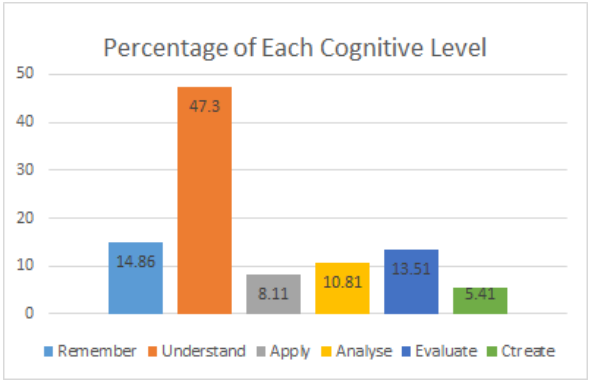


**Figure 2. Percentage of Each Cognitive Level**

Figure 2 describes the different ranges of the percentage of each cognitive level employed in the reading comprehension questions. According to the bar chart, the highest percentage of thinking skill is *Understanding* with 47.30%, nearly half of the all six levels of thinking skills and the lowest is *Creating* with 5.41%. Going on this study, *Remembering* is the second highest with the percentage of 14.86% and *Evaluating* is the third with 13.51%, and then *Analyzing* with 10.81% and *Applying* with 8.11%.

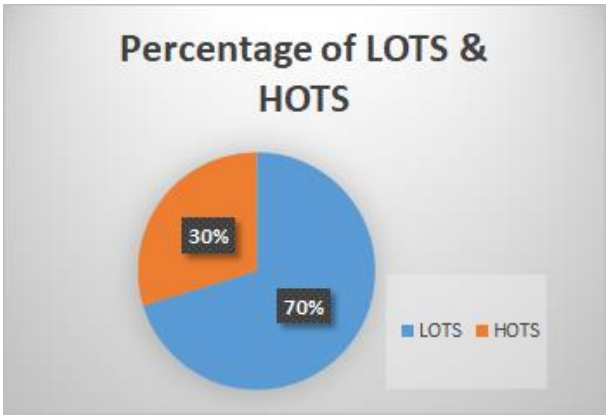


**Figure 3. Percentage of LOTS & HOTS**

Figure 3 prescribes the overall percentage of Lower Order Thinking Skill (LOTS) and Higher Order Thinking Skill (HOTS). According to the pie chart, it has about 70.27 % in LOTS, more than two third of the reading

comprehension questions and about 29.73%. in HOTS, only nearly one third. Based on the classification of this research, the reading comprehension questions are focused on the lower order cognitive levels of Boom's taxonomy while they lack the higher order cognitive levels.

### 2.4. Findings and Discussion

There are 74 total instructions analyzed according to the revised Bloom's taxonomy. It reveals that the reading comprehension exam questions of the third year English course at MIIT include both higher and lower levels of cognitive processes. It has 29.73% of the instructions in HOTS while 70.23% in LOTS. In spite of the fact that LOTS questions exceed more than two third of HOTS, it has no point to be judged that the questions cannot deal with students' critical thinking skills. The reading comprehension questions are acceptable for third year students in examining their critical thinking skills. It is important to note that Lower Order Thinking Skills (LOTS) _ knowing, understanding, applying _ can be taught at all language levels, not just lower level. Similarly, Higher Order Thinking Skills (HOTS) _ analyzing, evaluating and creating_ are not restricted to higher level of language skills; they can also be taught at lower level, too.

## .3. Conclusion

Creative thinking is one of the most essential life skills for survival in the globalization era. Due to the advances in technologies, a student must be able to think critically, not just to be able to read, to be considered literate. In the current situation, it is needed to shift from past memorization to critical thinking skill that is important in dealing with the complex issues of the world. Bloom's taxonomy is the basic for incorporating the process skills into the curriculum; it helps learners develop critical thinking and higher order cognitive abilities. The reading comprehension questions analyzed in this research indicated that they are still predominant on lower order thinking skills. However, the questions can be said that they are fruitful for the students because there are some critical thinking questions that can identify students' cognitive skills. In addition to this, the highest *understanding* questions in percentage can judge the students' reading skill properly; there has in-depth meanings. Therefore, an understanding of the effective use of Bloom's taxonomy when planning instructional reading comprehension instructions will increase students' use of higher order thinking skills. Taking everything into consideration, the main aim of such analysis is how to analyze the students' thinking levels aligned with their courses and to identify to what extent the reading comprehension exam questions of the third year course at MIIT refer to the levels of Bloom's taxonomy. It is sure that this study would be applicable to some extent for English Language teacher in assessing students' cognitive levels.

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