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The Incorporation of Higher Order Thinking Skills in Ruangguru Application for Senior High School Tenth Graders

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Abstract

This study is a content analysis that attempts to analyze the incorporation of higher-order thinking skills based on Bloom's revised taxonomy in English multiple-choice questions for tenth graders at *Ruangguru* application. Ten chapters of English subject for tenth graders including 120 randomly selected questions in the English exercises at the application were chosen as data source of this study. The findings show that the questions incorporate the order thinking skills with a percentage of 50,8% of lower-order thinking skills (LOTS) and 49,2% of higher-order thinking skills (HOTS), which means that both are not evenly distributed in every chapter. The most dominant level found in this study is *evaluation,* which includes checking and critiquing, with a percentage of 25,8%. The incorporation of HOTS in *Ruangguru* application has been proven, but the result cannot be generalized since not all students in Indonesia use the application. Thus, HOTS analysis to other learning applications, other grades, and/or other subjects are encouraged to be conducted to picture out the incorporation of HOTS in greater coverage.

Keywords: Higher Order Thinking Skills, Ruangguru Application, E-learning Application, Bloom's Revised Taxonomy.

INTRODUCTION

Higher-Order Thinking Skills (HOTS) is a thinking skill that not only requires the ability to remember but also requires other higher abilities, such as creative and critical thinking skills (Jaenudin, et al., 2020). HOTS defines a cognitive process that encompasses analysis, evaluation, and creation (Arif, 2019). HOTS assessment now becomes the focus of the government's program in increasing students' critical thinking, which is also one of the skills required in this 21st century (Partnership for 21st Century Skills, 2015). The research conducted by Arif (2019) stated that HOTS is important to apply in learning, particularly in making questions tested to students, so that students' critical thinking can be boosted up. HOTS is associated with the cognitive level of Bloom's Taxonomy (Pratama and Retnawati, 2018) which orders people's level of thinking from the lowest to the highest, they are remember, understand, apply, analyze, evaluate, and create (Munzenmaier and Rubin, 2013). The higher the level is, the more cognitive ability is required; thus, involving more complex way of thinking.

The recent reform of our education system has witnessed, among others, the incorporation of higher-order thinking skills into curriculum at all educational levels (Jerome, et. al, 2017), but the implementation of this curriculum has been unsatisfactory because of the new and unfamiliar format that challenges students'

conventional way of thinking and learning (Othman, 2014). The Directorate of High School Development in the International Standard Preparation Guide (2015) explained that the high school teachers only tended to measure lower order thinking skills that focused on theories, not contextual knowledge, which did not fit to the 2013 curriculum's requirements (Arif, 2019).

Some of the relevant studies analyzing the incorporation of HOTS on textbooks based on Bloom's revised taxonomy were also conducted. A study by Apriani (2019) showed that the distribution of HOTS was lower than LOTS. This is in line with Anasy's study in 2016 analyzing the distribution of HOTS based on Bloom's revised taxonomy in an essay question on the textbook. The study revealed almost similar results that the distribution of HOTS was lower than LOTS. Fakhira (2020) also found that the incorporation of HOTS in the reading questions were available in 50 questions (46,7%) while LOTS were in 57 questions (53,3%). It can be seen that the incorporation of HOTS in many textbooks in Indonesia is not yet evenly distributed. This situation was also mentioned by Kusuma, et al (2017) that the problems in school are the questions used in the assessment of cognitive instruments tended to test more aspects on the memory aspect, meanwhile, the questions that train students' higher order thinking skills are not quite available.

Besides the mastery of HOTS, students are now also required to have digital literacy. Several developments and new inventions in educational field have emerged along with the advancement of the internet and technology. Information and Communication Technology (ICT) for education is developing rapidly, making new ways of teaching using sophisticated educational media more widely practiced and easier to use. Students can access any learning materials to study whenever and wherever, even independently. Technology is nothing new to learners nowadays because they have experience in using smartphones, text messaging, and using the internet, so participating in and running an online course is easily implemented (Epignosis, 2014). The intended outcome of this increased IT-facilitated student engagement is to foster and support other important 21st-century skills such as HOTS in both academia and workplace environments (Saadé, 2012). Thus, e-learning systems or platforms have become popular among young learners, one of which is *the Ruangguru* application. It is the biggest and the most complete technology company in Indonesia focusing on educational-based services (Cahyani, 2019).

According to Fatimannisa, et al. (2020), students' perception towards the use of *Ruangguru* application in their English learning were positive because this learning platform combines various learning media, from video, infographic summary, quiz, and practice set. Permatasari and Soedarsono (2019) in their study found that the cognitive level of *Ruang Belajar* feature *in Ruangguru* application was on the level of understanding and was quite influential with a fairly high percentage of results.

Therefore, considering the above discussion, this present study was intended to do a content analysis on the incorporation of higher-order thinking skills in English multiple-choice questions for tenth graders in the practice set namely *Ruang Belajar* feature particularly in "*Latihan Topik*" section in *Ruangguru* application. The analysis was based on the cognitive level of Bloom's revised taxonomy proposed by Anderson and Krathwohl (2001), focusing only on HOTS which are *analyzing, evaluating,* and *creating*. Research on HOTS analysis in a learning platform is relatively new, making this worth doing.

RESEARCH METHOD

Qualitative approach with a content analysis method is adopted for this present study. The qualitative approach of research is generally characterized by inductive approaches to knowledge building aimed at generating meaning (Leavy, 2017). It is generally appropriate when the main purpose of the study focuses on exploring, describing, or explaining certain phenomena. The data of this study are analyzed in the form of description and identification or analysis of the texts. According to Krippendorff (2018), content analysis fits to make reliable and valid inferences from texts (or other meaningful matters such as video, audio, or pictural materials) to the contexts of their use.

The data of this study were the English multiple-choice questions sourced from *Ruang Belajar* feature particularly in "*Latihan Topik*" section for tenth graders in *Ruangguru* application. There were 120 multiple-choice questions from 10 chapters, namely Common Expression 1, Basic English in Introduction, Expression of Preference, Descriptive Text, Announcement, Past Tenses, Recount Text, Narrative Text, Once Upon A Time, and Comparison Degree. The questions were randomly selected from each available level (*mudah, sedang, sulit, HOTS*).

Focusing on the verbs of the questions, the data were analyzed to see their representation to the cognitive processes based on Bloom's Revised Taxonomy proposed by Anderson and Krathwohl (2001). To collect the data and analyze the cognitive process incorporated in the data of this research, the writer used two instruments: Bloom's Revised Taxonomy (BRT) table and table of description. To get comprehensive results, the tables were developed from the major source comprising criteria of the higher order thinking based on Bloom's Revised Taxonomy. The table comprised two dimensions of evaluation namely cognitive process dimension and knowledge dimension. From these dimensions, ten sub-aspects were derived, including four elements of knowledge dimension, which are A. Factual knowledge, B. Conceptual knowledge, C. Procedural knowledge, and D. Metacognitive knowledge, and six-level of cognitive process which are 1. Remember, 2. Understand, 3. Apply, 4. Analyze, 5. Evaluate, and 6. Create. The number 1-6 are the code for cognitive process dimension, while the alphabet A-D are the code for knowledge dimension. See table 1 below for detailed BRT table.

Knowledge Dimension	**Cognitive Dimension**					
	1. Remember *(choose, define, describe, find, identify, label, list, locate, match, name, recall, recite, recognize, record, relate, retrieve, say, select, show, sort, tell)*	**2. Understand** *(categorize, clarify, classify, compare, conclude, construct, contrast, demonstrate, distinguish, explain, illustrate, interpret, match, paraphrase, predict, represent, reorganize, summarize, translate, understand)*	**3. Apply** *(apply, carry out, construct, develop, display, execute, illustrate, implement, model, solve, use)*	**4. Analyze** *(analyze, ascertain, attribute, connect, deconstruct, determine, differentiate, discriminate, dissect, distinguish, divide, examine, experiment, focus, infer, inspect, integrate, investigate, organize, outline, reduce, solve (a problem)*	**5. Evaluate** *(appraise, assess, award, argue, check, conclude, convince, coordinate, criticize, critique, defend, detect, discriminate, evaluate, judge, justify, monitor, prioritize, rank, recommend, support, test, value)*	**6. Create** *(adapt, build, compose, construct, create, design, develop, elaborate, extend, formulate, generate, hypothesize, invent, make, modify, plan, produce, originate, refine, transform)*
A. Factual Knowledge *(Knowledge of the basic elements of its discipline).*						
B. Conceptual Knowledge *(Knowledge of classifications, categories, principles, generalizations, theories, models, or structures to the discipline area)*						
C. Procedural Knowledge *(knowledge of specific skills,*						

techniques, methods, and appropriate procedures)						
D. Metacognitive Knowledge *(the awareness of one's cognition and particular cognitive process, strategic knowledge, and knowledge about cognitive tasks, including appropriate contextual and conditional knowledge)*						

Table 1. Bloom's Revised Taxonomy Table (Anderson and Karthwohl, 2001)

The table of description was used to collect the selected questions from multiple-choice exercises based on BRT table which consists of the list of multiple-choice questions, the cognitive process of each questions and its description.

Chapter, Level	Multiple-choice Questions	Cognitive Process	Description
7, HOTS	Which of the following can be inferred from the passage?	A5	Students are expected to judge the following statements based on the passage given so that the question belongs to "evaluate" level. And the knowledge dimension is "factual knowledge" because it refers to the detail of the passage.

Table 2. Table of Description

RESULTS AND DISCUSSION

A. Results

The results showed that the higher order thinking skills were incorporated in the selected questions of English exercise for the tenth graders in *Ruangguru* application. In general, the analysis based on Bloom's Revised Taxonomy table showed that higher order thinking skills (HOTS) covered 49,2% while the lower-order thinking skills (LOTS) was 50,8%, and this result was in line with that of by Apriani (2019), Anasy (2016), and Fakhira (2020).The role of higher cognitive level in the multiple-choice questions in English exercise is very important to improve students' higher order thinking that is applied by the curriculum 2013. In other words, the questions are not only measuring the capability in answering multiple-choice reading questions, but also the capability to analyze, evaluate, and create new ideas and knowledge. Table 3 below illustrates in general the representation of lower-level and higher-level of cognitive process based on Bloom's revised taxonomy proposed by Anderson and Krathwohl (2001).

Knowledge Dimension	Cognitive Process					
	LOTS			HOTS		
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual	6,7%	10%	0%	6,7%	15%	0%
Conceptual	1,7%	2,5%	23,3%	12,5%	10%	0%
Procedural	0%	0%	0,8%	2,5%	0%	0,8%

Metacognitive	1, 7%	4,2%	0%	0,8%	0,8%	0%
Total	**10,1%**	**16,7%**	**24,1%**	**22,5%**	**25,8%**	**0,8%**

Table 3. Bloom's revised taxonomy dimensions represented in all chapters

The most dominant level of cognitive process found from data analysis was *evaluation,* that includes checking and critiquing, reaching the percentage of 25,8% with a total of 31 questions. The second most dominant level is *application* level which refers to using a learned procedure either in a familiar or new situation. The next highest occurrence is *analysis*, which consists of breaking knowledge down into its parts and thinking about how the parts relate to its overall structure. Students analyze by differentiating, organizing, and attributing. The next dominant category was *understand*ing level, which is the ability to make one's meaning from educational material such as reading and teacher explanations. *Remembering* level in which the students are required to recall and retrieve relevant knowledge from long-term memory was on number 5. The level with the lowest percentage was *creation* with a percentage of 0,8% or only one question. *Creation* was not included in the earlier taxonomy, but then becomes the highest component of cognitive process in the newest version. This skill involves putting things together to make something new.

Although this research only focuses on analyzing the cognitive processes, the knowledge dimensions were also described as it is an integral part of Bloom's Revised Taxonomy in cognitive process domain. The data of this study covered all four types of knowledge dimensions proposed in the BRT table. Based on Table 3 above, the most dominant knowledge dimension was found in the *conceptual knowledge* with a total of 60 questions whereas the least dominant was the *procedural knowledge* with a total of 4 questions, which refers to the knowledge of subject-specific techniques and methods.

B. Discussion

In terms of the cognitive process dimension, there were 12 questions or 10,1% classified as *remembering* level. The students were generally asked to tell, identify, describe, choose and retrieve some of the specific information from their prior knowledge which was relevant to the given text. The example of questions in this level are: "*Which of the following sentences uses participle adjective?", "Which one is not the type of announcement?",* and *"What was the initial reaction of Queen Elizabeth to the rumour of Spanish invasion?".*

The subskills for *understanding* process include interpreting, classifying, summarizing, inferring, comparing, and explaining. 20 questions or 16,7% were classified in *Understanding* level. From the questions, students were expected to interpret, predict, conclude, reorganize, and clarify a piece of information with their prior knowledge. They were also asked to identify some specific information such as a person, terminology, and an event from the reading passage or story. Some questions which belong to this level are "*Arrange the paragraphs above into a meaningful text!", "From the dialogue, we know that....", "What does the text tell us about?",* and *"What would probably happen if Jaka Tarub didn't pick up the pot lid?".*

Application level was distributed in 29 questions from all of the selected questions or equals to 24,1%. In this category, the students were expected to use, apply, carry out procedures such as rule of tenses and comparative degree in a given situation. The example questions from this level are *"I can't conclude ___ as Tina", "The most appropriate words to fill in the blanks are ....",* and *"I and Jimmy __from the house to the taxi because it __ heavily.".*

There were 27 questions or a total of 22,5% classified in *analysis* level. The questions mostly expected the students to determine the correct statements or expressions, arrange the words into the blank part in a sentence, also analyze and infer a conversation or information. To answer the questions, students were expected to read the given text or story carefully in order to understand the context or implied meaning of the text. Some of the questions in this level are *"What can we infer from the dialogue?", "What is true according to the dialogue?",* and *"Analyze the following sentence* and *find where the grammatical is located!".*

Evaluation level dominates the results with 31 questions of all selected questions or equals to 25,8%, most of which required students to detect errors or specific details, give their opinion, conclude a passage or

a story, and make a judgement based on their own opinion. Some of the questions in this level are *"Which statement is TRUE according to the dialogue?"*, *"What conclusion can we draw from the text*?", and "*Analyze the sentences below and find one that contains error!"*.

There was only 1 question or 0,8% classified in the *Creation* level. In this question, students needed to determine when to use appropriate procedures, in this case, they were expected to transform the underlined sentence into a compound adjective form. The question was "*Use the underlined phrase to form compound adjective!***".**

In terms of the knowledge dimensions proposed in Bloom's Revised Taxonomy and based on the description table, the most dominant knowledge dimension found in the data was *conceptual knowledge* with a total of 60 questions. The questions generally asked students about classifications and categories of a text or words, knowledge of principles of grammar, and structure of texts. The next dominant knowledge dimension was *factual knowledge* with a total of 40 questions. The questions generally asked the students about the factual information, specific details of the story, and knowledge of terminology. Next, a total of 10 questions were classified as *metacognitive knowledge* in which the questions generally asked the students to relate the questions with their own self-knowledge and conditional knowledge. Lastly, *procedural knowledge* became the least dominant knowledge dimension in the results with only 4 questions. This level refers to the students' knowledge on the subject-specific techniques and methods. Students were asked to understand how to do something in which they need to know how to use appropriate grammar rules into a sentence.

CONCLUSION AND RECOMMENDATION

As can be concluded from the data analysis above, the English multiple-choice questions sourced from *Ruang Belajar* feature particularly in "*Latihan Topik*" section for tenth graders in *Ruangguru* application had already incorporated higher-order thinking skills (HOTS). Based on Bloom's Revised Taxonomy table, HOTS covered 49,2% of the total data while LOTS was 50,8%. It means that the English exercise in *Ruangguru* application already promotes the cognitive process dimension in higher order thinking skill, even though the percentage was a bit lower than that of the lower order thinking skills. Moreover, among the six cognitive processes, *Evaluation* level became the mostly used cognitive process found in the multiple-choice questions in the application with a percentage of 25,8%. Among the four dimensions of knowledge, the most used was the *conceptual knowledge* with a total occurrence of 60 questions. The role of multiple-choice HOTS questions in English exercise is very essential to improve students' higher order thinking. It means that the questions should be able to measure both the capability in answering multiple-choice reading questions, and the capability to analyze, evaluate, and create new ideas and knowledge. Thus, it helps build critical thinking through the questions.

Regardless of the findings of this research and its limitation, the researcher proposes some helpful recommendations for everyone who reads this article. The incorporation of higher order thinking skills in *Ruangguru* application has been proven, but not all students in Indonesia use the application; therefore, further research on HOTS available in other learning applications needs to be conducted. Further research is also encouraged to be conducted to other levels or grades, either in the same platform or different ones, or even in other subjects. With a greater coverage, it is hoped that better profile of HOTS can be projected so that betterment can be taken by all parties, such as government, schools, and material developers.

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