

CHAPTER II

REVIEW OF RELATED LITERATURE

This chapter presents the underlying theories that are relevant to the research problems. This study review consist of Test Items, Higher Order Thinking Skills (HOTS), HOTS Test Guidelines. It then serves the previous and related studies which discussing the contrast and similarities with this study.

A. Test

1. Definition of Test

Test is something or such as a series of questions or exercise for measured knowledge, intelligence, capacities or aptitudes of an individual or group. Another posit, test suppose to be able to measure learning outcome which distinguish the every single student's ability between students already mastered and not yet the learning material. This notion is supported by Hughes (2003) stated that a test is a tool to measured language proficiency of students. Brown (2004) deem that a test is a method of measuring a person's ability knowledge, or performance in a given domain. In the same line, Anthony J Nitko (1983) defined test is systematic procedure for observing and describing one or more characteristics of person with the aid of either a numerical of category system.

Test is considered a useful tool of evaluation. Genesee and Upshur (1996) defined a language test is a set of tasks requiring observable responses to language or in language that can be scored and interpreted with reference to norms, domains or instructional objectives. Therefore, the selection of testing method is paramount in reflecting the language curriculum, syllabus, evaluation, testing skills which are intended to test and tried not to contaminate the test performance through avoiding irrelevant skills or knowledge.

Genesee and Upshur (1996:141) described particular essential aspects to consider when devising and using the test due to the difficulty in distinguishing tests from other method of collecting information. A test is, first of all, about something i.e., intelligence, or European history, or second language proficiency. In educational terms, tests possess subject matter or content. Second, a test is a task or set of tasks that elicits observable behaviour from the test taker.

Different test tasks have different methods of eliciting performance. Third, tests yield scores that show attributes or characteristics of individual. To interpret the test scores a frame of reference is necessary, and the process is called measurement. Thus, the tests are a form of measurement. In conclusion, tests have three aspects: content, method, and measurement.

Silverius (5:1991) define test as a systematic procedure for observing and describing one or more characteristics of a person with the aid of either a numerical scale or a category system. Based on the definitions above, test is a specific type of assessment which typically consists of a set of questions conducted during a fixed period of time under fairly comparable conditions for all students.

In short, a test as an instrument of evaluation is a systematic procedure of description, collection and interpretation in order to measure the test taker's achievement ability, knowledge and performance what they have been learned in learning process and to get a value judgment. The purpose of a test is able to give the valid information on the students' abilities and knowledge. Accordingly, the sucessfullnes of the teaching and learning can be seen in the test's results.

2. Test in 2013 Curriculum

2013 curriculum is the applicable curriculum in the educational system in Indonesia. It is a fixed curriculum by the government to replace the curriculum of 2006 or usually known as *KTSP*. Currently, in 2016, the Ministry of Education and Culture of Indonesia revised the 2013 curriculum which known as 2013 Curriculum revised edition. In this new edition of 2013 curriculum, students are required to think deeply in order to develop their cognitive competence by giving some exercises or questions in higher order thinking skill or commonly called as HOTS. The application of scientific approach that includes questioning, gathering

information, reasoning, and communicating is expected to change the students' learning behaviour becomes more active. In other words, learning is expected to be at a higher level in the cognitive, attitude, and psychomotor aspects. The application of the learning models becomes an opportunity for the teachers to carry out the learning activities at the higher order thinking skill (HOTS) level.

The 2013 Curriculum is a competency-based curriculum. Test of learning outcomes students in the 2013 curriculum include aspects of attitude, knowledge and skills. Tools that needed to prepare by the teacher before the assessment is determined the *Kriteria Ketuntasan Minimal* (KKM) and purvey assessment' instrument. KKM will turn out primary remed activities or enrichment that will be carried out by students.

KKM is criterion for mastery learning that is determined by the education unit with reference to graduate competency standards. In determining KKM, unit education must formulate together between the principle, educators and other education personnel. KKM is formulated at least with pay attention 3 (three) aspects, namely the students' characteristics (intake), subjects' characteristic (material complexity/ competency), and education' conditions unit (teacher and carrying capacity) in the process achieving competence. There were several KKM models. The KKM model consist of more than one KKM or just one KKM. The educations' unit can prefer one of the model.

After the KKM was determined, student learning outcomes can be evaluated totally. Students who have not yet reached the KKM means they didn't yet enough, and counsel to follow the remedial program, while students who have reached the KKM declared complete and can given enrichment.

3. Characteristics of Good Test

In order to know criteria of a good test for measuring students' ability has been reached in learning process, a test as an instrument of evaluation has to meet requirements the validity, reliability, and practicality. As stated by Brown (2004), there are three important aspects should reflect in a test, namely reliability, validity and practicality. Gronlund (1998) pointed out that validity is the extent to which inferences made from assessment results are appropriate, meaningful and useful in terms of the purpose of the assessment.

According to Heaton's study (*Classroom Testing*), there are many reasons for giving a test, but however the teacher prepares a test, he or she must think of the real purpose of the test which is given to the students. One of the most important reasons is to find out how well the students have mastered the language, areas and skills that have just been taught. These tests look back and they are called *Progress tests*. If the teacher tests what has been recently taught and also practiced then there is an expectation that students will score fairly high marks. If it does not happen and many students fail, something must be wrong either with the teaching

itself, the materials or students' understanding of the syllabus. Also progress tests at the end of a unit or a semester should reflect progress, not failure. The teacher should try to give progress tests regularly, but it is very important to avoid over-testing, which de-motivates the students. "The best progress test is one which students do not recognize as a test but see as simply an enjoyable and meaningful activity" stated Heaton (2000).

B. Higher Order Thinking Skills (HOTS)

1. Definition of HOTS

Higher order thinking skills is skill to think critically to solve or overcome problem to any phenomena or information, that's include analysis, evaluation, and creating or take in Bloom's taxonomy revised by Anderson and Krathwohl called as Cognitive taxonomy or another application of thought processes to complex situation and have many variables. All students can think, but most of the students need encouragement and guidance for higher order thinking processes (Shiddiq et al, 2015: 159). Higher order thinking skills includes three cognitive processes, namely analysis, evaluation, and creation (Brookhart, 2010: 5). Higher order thinking skills can be interpreted into three meanings namely, as transfer, as critical thinking skills, and as problem solving (Brookhart, 2010: 5-8).

Higher order thinking skills as transfers means that students actively process them by noticing relevant new information. Then, the students arrange them into related units and then combine new information with previous information. As critical thinking skills imply that students can apply judicious judgments and produce a critical idea. While as problem solving means that students are expected to be able to solve problems with creative solutions effectively.

Mc Loughlin and Luca (in Widodo and Sri, 2013: 162) state that higher order thinking means the ability to understand information by applying critical attitudes, evaluation, awareness and problem-solving skills. It requires a lot of cognitive processes. Correspondingly, the higher order thinking skills of King, Goodson, and Rohani (2004: 1-2) include critical thinking, logical, reflective, meta-cognitive, and creative.

Newman and Wehlage (in Widodo and Sri, 2013: 163) also revealed that higher order thinking requires students to manipulate information and ideas by changing meanings and implications, such as when students combine facts and ideas to synthesize, summarize, explain, and conclude or interpret. Based on some expert opinions above, it is concluded that higher order thinking skills encourages students to be able to synthesize, summarize, clarify, and summarize issues with active, critical, logical, creative, reflective, and meta-cognitive thinking. This thinking technique is the cognitive process at the top three levels of the

revised version of Bloom's taxonomy, which are analysis, evaluation, and creation.

2. Implementation HOTS in Indonesia

A study conducted by Program for International Student Assessment (PISA) in 2015 showed that, out of 72 countries, Indonesia was one that has the lowest level of reading performance. The result demonstrated that the score of Indonesian students (397) is lower than the means of all countries (493). It might have happened due to the fact that Indonesian students are poorly trained to cope with situations that require contextual problems, reasoning, argumentation and creativity which are the characteristics of HOTS-based questions (Fanani, 2018). In line with Fanani (2018), The Government (2017) also mentioned that Indonesian students have poor ability to (1) understand complex information; (2) understand theories, analyze, and solve problems; (3) use of tools, do procedures and solve problems; and (4) conduct an investigation.

In response to this issue, Indonesian Ministry of Education and Culture tried to integrate HOTS in the existing curriculum which is 2013 curriculum (Kemendikbud, 2017). In line with the Revised Bloom's Taxonomy, the Government established Regulation of Ministry of Education Number 22 Year 2016 about Standard Process of Elementary as well as secondary level of education (Kemendikbud, 2016). The regulation stated that the aspect of thinking process is acquired by activities of

Remembering, Understanding, Applying, Analyzing, Evaluating and Creating.

C. The Dimension of Thinking Process

1. Revised Bloom's Taxonomy of Thinking Process

Bloom's Taxonomy was created in 1956 under the leadership of educational psychologist Dr. Benjamin Bloom who was born in Pennsylvania and earned doctorate in education from the University of Chicago in 1942. Taxonomy is another word for classification. According to Pratiwi (2014) taxonomy means classification hierarchy over basic principles or rules. Bloom Taxonomy is a classification system of cognitive thinking skills developed by Bloom. It has been extremely influential in education for the past 50 years (Krathwohl, 2002). In the 1970s, Bloom taxonomy was used as a tool for objectives-based evaluation and as a model for designing items that measure low-level skills versus higher-level skills (Marzano & Kendall, 2007). The 1980s were the years that emphasized the teaching of higher level of thinking and the validity of Bloom's Taxonomy was considered to be revised. In May 1984, the association for supervision and curriculum development (ASCD) recognized the problem of poor performance of students with higher-level thinking tasks (Marzano & Kendall, 2007). Unfortunately, the association collaboration did not produce a revision of Bloom's Taxonomy.

Anderson, Krathwohl and some colleagues then published a revision of the Bloom's taxonomy in 2001. The revision result named as Bloom's revised taxonomy. The revised taxonomy improves the original by adding a two-dimensional framework, that is, cognitive process dimension and knowledge dimension. The cognitive dimension is very much like the Bloom's original taxonomy. There are only few significant changes. One of the main changes is the uses of verbs which describe actions (Stanley & Moore, 2013). The other change is that the position of cognitive levels, evaluating (C5), comes before creating (C6). There are two points revised such as the following (Anderson & Krathwohl, 2001):

Basically, Bloom's six major categories were changed from noun to verb forms. Anderson and Krathwohl (2001) define the Bloom's new taxonomy as:

- Remembering: Retrieving, recognizing, and recalling relevant knowledge from long-term memory.
- Understanding: constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
- Applying: carrying out or using a procedure through executing, or implementing.
- Analyzing: breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.

- Evaluating: making judgements based on criteria and standards through checking and critiquing.
- Creating: putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

However, the Bloom’s taxonomy has also been revised. It is presented with the Bloom’s definition about the aspects of thinking both in LOTS and HOTS. The following is the revised version of Bloom’s taxonomy. In the Revised Bloom’s Taxonomy, Cognitive dimension looks very similar with the original Bloom’s taxonomy, except that the order of the last two levels is reversed. Furthermore, since Knowledge dimension uses the word knowledge, the first level of the Cognitive dimension is called “Remember.” So the Revised Bloom’s Taxonomy comprises the level of Remember, Understand, Apply, Analyze, Evaluate, and Create (Krathwohl, 2002). The first three levels which are Remember, Understand and Apply are categorized as Lower-Order Thinking Skill. Meanwhile, HOTS consists of the last three levels which are Analyze, Evaluate, and Create (Moore & Stanley, 2013). The basic keywords that mostly appear within questions, based on the Revised Bloom’s Taxonomy were illustrated in Table 2.1

Table 2.1 Revised Bloom’s Taxonomy Action Verbs

Definition	I Remember	II. Understand	III. Apply	IV. Analyzing	V. Evaluate	VI. Create
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Bloom's Taxonomy Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts and answer	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	Choose Define Find How Label List Match Name Omit Recall Relate	Classify Compare Contrast Demonstrate Explain Extend Illustrate Infer Interpret	Apply Build Choose Construct Develop Experiment Identify Interview Make use of Modal Organize	Analyze Assume Categories Classify Compare Conclusion Contrast Discover Dissert Distinguish Divide Examine	Agree Appraise Assess Award Choose Compare Conclude Criteria Criticize Decide Deduct Defend	Adapt Build Change Choose Change Combine Compose Construct Create

Select	Outline	Plan	Function	Determin	Delete
Show	Relate	Select	Inference	Disprove	Design
Spell	Rephras	Solve	Inspect	Estimate	Develop
Tell	e	Utilize	List	Evaluate	Discuss
What	Predicti		Motive	Explain	Elaborat
When	ng		Relationshi	Importance	e
Where	Show		ps	Intepret	Estimate
Which	Summar		Simplify	Judge	Formula
Who	ize		Survey	Justify	te
Why	Translat		Take part	Mark	Happen
	e		in	Measure	Imagine
			Test for	Opinion	Improve
			Theme		Invent
					Make up
					Maximi
					ze
					Minimiz
					e

D. HOTS Test Guidelines

1. Definition and Characteristics of HOTS Test

Thinking activities have been done since humans exist, but understanding about thinking is still being debated by various groups, especially among thinkers education. According to Dewey (1859 - 1952) thinking is a psychological activity when a situation of doubt arises, whereas Vygotsky (1896 - 1934) is more linking think with mental processes. In general, thinkers agree that thinking is a mental activity experienced by people when people it is faced with a situation or a problem that must be solved.

Thinking is always related to the process of exploring ideas, forming various possibilities or alternatives that vary, and can find a solution. One taxonomy of thought processes that is widely referred to is taxonomy Bloom and has been revised by Anderson & Krathwohl (2001). In taxonomy, the lowest level thought process is *remembering*, because remembering is just calling back cognition that already exists in memory. *Understanding* is one level higher than remembering. Someone who understands something will be able to use his memory to make descriptions, explain, or provide related examples of something. If someone who has understood something is able to do back to things he understood in a new situation or a different situation, the person has reached the level of thinking application (*applying*). People who have the ability to apply may not be able to finish problem (*problem solving*). The ability to apply is still likely only repeat the process that has been done (routine), while the problem can always be different and generally cannot be solved in a way same (non routine). Real problem solving is related to matters non-routine ones. Therefore, problem solving requires a level of thinking which is higher than remembering, understanding, and applying. This level of thinking called *higher order thinking* or higher level thinking.

Anderson and Krathwohl categorize the ability of the analysis process (*Analyzing*), evaluating (*evaluating*), and creating (*creating*) include thought high level. Analyzing is the ability to describe something

inward smaller parts so that deeper meaning is obtained. Analyzing in the revised Bloom's taxonomy also includes capabilities organizing and connecting between parts so that meaning is obtained more comprehensive. If the ability to analyze ends critical thinking process so that someone is able to take decisions with Exactly, the person has reached the level of evaluating thinking. From activities evaluation, someone is able to find weaknesses and strengths. Based on the weaknesses and strengths are finally generated ideas or ideas new or different from existing ones. When someone is able to produce ideas or a new or different idea that level of thinking is called the level of thinking create. Someone who is sharp in his analysis, able to evaluate and take the right decision, and always gives birth to ideas or new ideas.

Therefore, the person has a great chance of being able to solve each the problems they face. In the selection of operational verbs (KKO) to formulate the question indicators HOTS, you should not be trapped in the KKO grouping. For example words "determining" work on Bloom's Taxonomy is in the domains of C2 and C3. In the context of writing *HOTS* questions, the verb "determine" may be in the realm C5 (evaluating) if to determine the decision is preceded by a process. Thinking about analyzing the information presented on the stimulus then learners asked to determine the best decision. Even the verb "determines" can classified C6 (creative) if the question requires the ability to compile new problem solving strategies. So, the realm of operational verbs (KKO)

is very influenced by the thought process what is needed to answer the question which is given.

Brookhart (2010) agrees with the concept of high-level thinking Bloom's taxonomy was revised by Anderson and Krathwohl above. Practically Brookhart uses three terms in defining thinking skills high level (*HOTS*), namely: *HOTS* is a transfer process, *HOTS* is critical thinking, and *HOTS* is problem solving. *HOTS* as a transfer process in the context of learning is giving birth meaningful learning (*meaningful learning*), namely the ability of deep learners apply what has been learned to a new situation without direction or guidance of educators or others. *HOTS* as a critical thinking process in the context of learning is forming students who are able to think logically (make sense), be reflective, and take decisions independently. *HOTS* as a problem-solving process is to make students capable solving real problems in real life, which are generally of a nature unique so the settlement procedure is also unique and not routine. Viewed from the dimension of knowledge, generally the matter of *HOTS* measures the dimension metacognitive, not merely measuring factual, conceptual, or procedural dimensions only. The metacognitive dimension describes the ability to connect several different concepts, interpret, solve problems (*problems solving*), choosing a problem solving strategy, finding (*discovery*) a method new, argument (*reasoning*), and take the right decision. Based on the description above, higher level thinking skills are logical thinking skills,

critical, creative, and *problem solving* independently. Logical thinking is the ability to reason, which is thinking that can be accepted by common sense because it meets the rules of scientific thinking. Critical thinking is thinking reflective-evaluative. Critical people always use knowledge and experience to analyze new things, for example in a way compare or identify the strengths and weaknesses so able to justify or make decisions. Meanwhile, think creatively is the ability to find ideas / ideas that are new or different. With a new or different idea, someone will be able to do various things innovation to solve various real problems it faces (Kemdikbud, 2019)

2. Basic Principles of Assessment of Higher-Order Thinking Skills

Doing and making a higher order thinking assessment requires three basic principles that will help teachers assess high-order thinking skills (Brookhart, 2010: 25).

- 1) Using the introductory material
- 2) Students are allowed to use material resources that can help students to think. Teachers can also provide stimulus that can assist students in solving problems such as pictures or tables.
- 3) Using novelty materials

The novelty material means the student's test materials have not been worked on in classroom teaching. Using novelty material means

students must really think, not just remember the materials that are already done.

4). Separately present cognitive complexity and difficulties

A test that measures higher order cognitive processes does not mean that tests are including difficult category. The integrity of the cognitive process describes to what extent the students' thinking process. The difficult test can be realized through unfamiliar questions to measure student's insights.

3. Characteristics of Hots Assessment Instruments

Questions including *Higher Order Thinking* have the following characteristics:

1. transfer one concept to another;
2. processing and applying information;
3. looking for links from various different information;
4. use information to solve problems;
5. critically examine ideas and information.

HOTS questions are highly recommended for use on a variety class assessment forms and School Exams. To inspire the teacher arrange *HOTS* questions at the education unit level, as follows presented the characteristics of *HOTS* questions . That, some characteristics of assessment instruments are described think high level (*HOTS*) (Kemdikbud, 2019)

1) Measuring the ability to think at a higher level

The Australian Council for Educational Research (ACER) states that Higher-order thinking skills are processes: analyzing, reflect, give arguments (reasons), apply concepts to situations different, compose, create. Higher-order thinking skills is not the ability to remember, know, or repeat. Thus, the answers to *HOTS* questions are not explicitly stated in stimulus. Higher-order thinking skills including abilities to solve problems (*problem solving*), critical thinking skills (*critical thinking*), *creative thinking*, ability arguing (*reasoning*), and the ability to take decisions (*decision making*). The ability to think at a higher level is one important competence in the modern world, so it must be owned by every learners. Creativity solves problems in *HOTS*, consisting on:

- a. ability to solve unfamiliar problems;
- b. the ability to evaluate the strategies used to complete problems from different points of view;
- c. find new settlement models that are different in a way before.

'Difficulty' is NOT the same as higher order thinking . Level of difficulty in items are not the same as higher order thinking skills. As for example, to find out the meaning of an uncommon word (uncommon word) might have a very high difficulty, but the ability to answer these problems does not include higher order thinking skills. Thus, *HOTS* questions are not necessarily problems which has a high degree of difficulty. Higher-order thinking skills can be trained in the learning process in the classroom. Therefore, so students have the ability

to think high level, the learning process also gives space to learners to find the concept of activity-based knowledge. Activities in learning can encourage students to build creativity and critical thinking.

2) Divergent

HOTS assessment instruments must be divergent, meaning possible students provide answers that vary according to the thought process and the point of view used because it measures analytical thought processes, critical, and creative that tends to be unique or different the response for each individual. Because it is divergent, *HOTS* assessment instruments are easier to design in the format of assignments or open questions, for example essay / description questions and performance task, as long as the thought process to answer the matter of choice it is not merely memorizing or repeating. Instead, every question the description is also not necessarily *HOTS* if to answer it does not require reasoning. Even performance tasks are not necessarily *HOTS*, if only in the form of a recipe so that students only do the instructions was given.

3) Using Multirepresentations

HOTS assessment instruments generally do not present all information explicitly, but it forces students to dig for information themselves between the lines. Even in the era of *big data* like today, namely convenience get data and information through the internet, it is appropriate *HOTS* assessment instruments also demand that students not only search itself information, but also critical in selecting and sorting

information necessary. To meet the above expectations, we recommend the instrument *HOTS's* assessment uses a variety of representations, including verbal (in sentence form), visuals (pictures, charts, graphs, tables, including videos), symbolic (symbols, icons, initials, gestures) and mathematical (numbers, formulas, equation).

4) Contextual based problems

HOTS questions are based on real-life situations daily life, where students are expected to apply learning concepts in class to solve problems. Contextual problems faced by the world community today related to the environment, health, earth and space, and the use of science and technology life. In that sense also includes how learners' skills to connect (*relate*), interpret (*interpret*), apply (*apply*) and integrate (*integrating*) science into classroom learning solving problems in a real context. The following is described five characteristics of contextual assessment, abbreviated as *REACT*. *Relating*, assessment is directly related to the context of experience real life. *Experiencing*, assessment emphasized the excavation (*exploration*), discovery (*discovery*), and creation (*creation*). *Applying*, an assessment that demands the ability of students to apply the knowledge gained in the classroom to solve real problems. *Communicating*, assessment that demands the ability of students to be able to communicate the conclusions of the model to conclusions problem context. *Transferring*, assessment that demands the ability of

students to transform the concepts of knowledge in the classroom into new situation or context.

The characteristics of contextual assessment based on authentic assessment are as follows.

- a. Learners construct their own responses, not just choose available answers;
- b. Tasks are challenges faced in the real world;
- c. The assignments given do not only have one particular answer correct, but allows many correct answers or all correct answer.

5) Using various forms of questions

The forms of questions vary in a set of tests (questions *HOTS*) as used in *PISA*, aims to be able provide more detailed and comprehensive information about capabilities test taker. This is important to be considered by the teacher so that the assessment done can guarantee objective principles. the ability of learners accordingly with the real situation. Evaluation is done in a manner objective, can guarantee the accountability of assessment. There are several alternative forms of questions that can be used for writing *HOTS* items including multiple choice and description.

a) Complex multiple choice (true / false, or yes / no)

Complex MCQs aim to test understanding learners to a problem comprehensively related between one statement to another. As a matter of multiple choice usual, *HOTS* questions in the form of complex multiple

choice also contain stimulus that originates in contextual situations. Students are given several statements related to the film / reading, then the participants students are asked to choose true / false or yes / no. Statements given is related to one another. Arrangement true and false statements to be randomized, not systematic follow a certain pattern. A systematic patterned arrangement can give hint to the right answer. If students answer correctly in all statements given a score of 1 or if there was an error in one of the statements so it was given a score of 0.

b) Description

The question form is a question whose answers demand participants students to organize ideas or things that they have learned by expressing or expressing the idea use the sentence itself in written form. In writing about the form of description, the question writer must have a picture about the scope of the material being asked and the scope of the answers expected, depth and length of answers, or details of answers that are might be given by students. In other words, this scope indicates the broad or narrow criteria of the problem being asked. In in addition, the scope must be firm and clearly delineated in formulation of the problem.

4. Cognitive Level

As explained earlier, there are several verbs operational (KKO), but in different domains. This difference in interpretation often arises when the teacher determines the realm of KKO which will be used in writing the question indicator. To minimize these problems, Puspendik (2015) classifies

them into 3 cognitive level as used in the UN lattice since years 2015/2016 lessons. The cognitive level grouping is: knowledge and understanding (level 1), application (level 2), and reasoning (level 3) (Puspendik:2017)

1) Knowledge and Understanding (Level 1)

The cognitive level of knowledge and understanding includes the process dimension think knowing (C1) and understanding (C2). Characteristics of questions at level 1 is measuring factual, conceptual, and procedural knowledge. Sometimes questions at level 1 are difficult, because for answering these questions students must be able to remember a few formulas or events, memorize definitions, or mention steps step (procedure) to do something. But the questions at level 1 are not *HOTS* questions

2) Application (Level 2)

Problems at the cognitive level of application require more ability higher than the level of knowledge and understanding. Application cognitive level includes the dimensions of the thought process of applying or applying (C3). The characteristics of questions at level 2 are measuring ability: a) using certain factual, conceptual, and procedural knowledge of other concepts in the same maple or other maple; or b) apply specific factual, conceptual, and procedural knowledge for resolve contextual problems (other situations). Could be questions on level 2 is a medium or difficult category question, because to answer these questions students must be able to remember some formulas or events, memorizing

definitions / concepts, or mentioning steps (procedure) do something. Then this knowledge is used on other concepts or to solve contextual problems. But questions on level 2 are not *HOTS* questions. Example KKO that are frequently used are: applying, using, determine, count, prove, and so on.

3. Reasoning (Level 3)

Reasoning level is a level of ability to think high level (*HOTS*), because to answer questions at level 3 students must be able remembering, understanding, and applying factual, conceptual knowledge, and procedural as well as having high logic and reasoning for solving contextual problems (real situations that are not routine). The level of reasoning includes the dimensions of analyzing thought processes (C4), evaluating (C5), and creating (C6). On the dimension of the thought process analyze (C4) demands the ability of learners to specify aspects / elements, describe, organize, compare, and find implied meaning. On the dimension of the process of evaluating thinking (C5) demands the ability of students to form hypotheses, criticize, predict, judge, test, justify or blame. While in the dimension of the process of thinking to create (C6) requires ability students to design, build, plan, produce, find, renew, perfect, strengthen, beautify, compose. Problems at the level of reasoning are not always are difficult questions. The characteristics of questions at level 3 are demanding the ability to use reasoning and logic to take decision (evaluation), predict and reflect, and ability devise new strategies

to solve contextual problems that don't routine. The ability to interpret, look for relationships between concepts, and the ability to transfer one concept to another, constitutes a very important ability to solve level 3 problems (reasoning). Operational verbs (KKO) that are often used include: describe, organize, compare, arrange hypotheses, criticize, predict, assess, test, conclude, design, build, plan, produce, find, renew, perfecting, strengthening, beautifying, and composing.

5. Developing HOTS Test

In preparing *HOTS* questions , the question writer is required to be able to determine the competencies to be measured and formulate the material to be used as a basis for questions. The question is accompanied by an appropriate stimulus in certain contexts in accordance with expected competencies. Besides that, high-reasoning material that will be asked, is not always available in textbooks. Therefore, in compiling the questions *HOTS* required mastery of teaching materials, skills in writing questions (question construction), and teacher creativity in choosing stimulus questions accordingly with the situation and condition of the area around the education unit.

Following are the steps for preparing the *HOTS* question, Analyze KD. KD analysis begins by determining the KD contained in Permendikbud no. 37 in 2018. Furthermore, KD has been determined analyzed based on cognitive level. Not all KD available in Permendikbud no. 37 of 2018 are in

a cognitive level same. KD at the cognitive level C4 (analyze), C5 (evaluating), and C6 (creating) can be arranged about *HOTS*. KD which are at the cognitive level C1 (remember), C2 (understand), and C3 (applying) cannot be directly composed about *HOTS*. The KD can *HOTS* is compiled, if previously GPA was formulated first enrichment with cognitive levels C4, C5, and C6. Teachers independently or through the KKG / MGMP forum can do KD analysis that can organized into *HOTS* questions.

Analysis of the cognitive level of KD to be measured.

3.5 Analyze the digestive system in humans and understand disorders related to the digestive system, as well as efforts maintain a healthy digestive system. The verb "analyze" in context in KD 3.5 is at the level cognitive C4 (analyze) or at level 3 (C4). The verb "to understand" in the context of KD 3.5 is at the cognitive level C2 (understanding) or at level 1 (C2):

Arrange the test specification. The test specification is used by the teacher to arrange *HOTS* questions. Accordingly general, the grid guides the teacher in: choose KD that can be made about *HOTS*, determine the scope of the material and materials related to BC to be tested, formulating the problem indicators, determine the number of questions, determine cognitive levels (L1 for cognitive levels C1 and C2, for L2 C3, and L3 levels for cognitive levels C4, C5, and C6); and Determine the form of questions to be used.

e. determine cognitive levels (L1 for cognitive levels C1 and C2, for L2 C3, and L3 levels for cognitive levels C4, C5, and C6); and Determine the form of questions to be used.

Choosing the right stimulus and contextual. The stimulus used must be precise, meaning that it encourages students to look at the problem. The right stimulus is generally new and has never been read by students. Contextual stimuli meant that stimulus in accordance with reality in daily life, interesting, encouraging learners to read. In the context of School Exams, teachers can choose a stimulus from the school environment or the local area.

Write question items according to the test specification. The items are written according to the writing rules of the items *HOTS*. The rules for writing *HOTS* items are quite different from the rules writing about items in general. The difference lies in aspects material, while the aspects of construction and language are relatively the same. Every Item items are written on the question card, according to the format attached.

Make a scoring guideline (rubric) or answer key
Every *HOTS* item written should be accompanied by guidelines scoring or answer key. Scoring guidelines are made for forms Essay Questions. While the answer key is made for the form of choice questions multiple, complex multiple choice (true / false, yes / no), and short entries. (Kemdikbud, 2019)

E. Previous Studies

Studies conducted in the last several years indicated that High Order Thinking Skills is lack attention that's essentially field to study particularly in developing test. Even though there are a lot of previous studies discussing on High Order Thinking Skill, for example from Ismail (2019) study about teachers' level knowledge on high order thinking skills in Malaysia and showed that lack references to be major problems for teachers in implementing HOTS. Shamiliati (2017) investigates teachers challenges in teaching and learning for higher order thinking skills (HOTS) in primary school. Teachers faced several challenges in teaching and learning for HOTS, the challenges were in the aspects of teachers, teaching and learning preparations and process. This study is just focuss on the learning HOTS process.

By the same research objective, Retanwati (2018) analyzed about the teachers' knowledge about Higher Order Thinking Skills and its learning strategy, an showed that teachers' knowledge about HOTS, their ability to improve students' HOTS, solve HOTS based-problems and measure students' HOTS is still low.

Another studies from Imeldawaty (2018) showed that the practice of higher order thinking skills in Indonesia is still low. Wismayani (2019) also conduct study about the reflection of HOTS in EFL Teachers' Summative test and assert that the cognitive thinking process is still in Lower Order Thinking Skills (LOTS) and did not fully understand the

concept of Higher Order Thinking Skills (HOTS). That results of study supported by the study from Driana (2019) stated that HOTS test instrument had a misunderstanding in HOTS items, and she include analyze in the form of multiple choice items.

The newest study that conducted by Indah (2019) showed that there are some trends and also challenges in making HOTS test. Trends in making HOTS test is include the analysis, judgment and critical thinking and logic reasoning skills. While the challenges is around how to design HOTS test, finding a source about how to design HOTS test, finding a source about how to design English HOTS test, mapping learning domain, deciding level of difficulty and building literacy assessment.

Based on the theories and previous studies, some points can be concluded that the teachers' perception and knowledge in HOTS is still low, HOTS practice in classroom is tend low practice, the implementing HOTS in teachers test items is manifest stuck in LOTS domain (remembering, understanding and applying), HOTS assessment trends' and challenges need a lot of possibility to explore and researched. Hence, teachers must insight about HOTS test. Therewith, the success of the development of higher order thinking skills is also determined by the assessment that is developed and used by teachers. Because of this, teachers need to improve their skills when understanding concept and constructing assessment instruments as one of the competencies that professional teachers need to have. The researcher is not only traced what

the way they make a HOTS test, but prefer in their HOTS' understanding concept and the practice developing the test items.

