

CHAPTER II REVIEW OF RELATED LITERATURE

This chapter gives a brief explanation about theories that support this study. There are two sub-section in this chapter, the review of related literature and the previous studies regarding with the analysis of student teacher designed-tasks in facilitating higher order thinking skills.

A. Theoretical Framework

1. Higher Order Thinking Skills

Teachers are demanded to transfer the knowledge or competence to students. However, competence is not the only thing to teach. The students' way of thinking is also important to teach; how the students can get the knowledge. As a broad definition, it is correct that thinking is defined as a mental activity.³⁹ It is because mental activity covers many things. Mental activity in the brain that people cannot see as like physical activity. Mental activity or performance here can be remembering or recalling the fact, reasoning, decision making and solving a problem. Further, Edward De Bono stated that thinking is also defined as logic and reason.⁴⁰ It deals with the activity of thinking to give a logic reason. Then, thinking skill is defined as the ability in transforming the knowledge and generating new ideas.⁴¹ It is the way how people explore and apply the idea to the new situation. It is also dealing with the way how people solve the problem by deciding the best solution for the problem. Further, it relates to people's creativity.

Realizing or not, people may think without thinking. It happened when people are asked about their name or what they like to drink; tea or coffee. People can easily answer it without much thinking skills. However, one of education

³⁹ Edward de Bono. *Teaching Thinking*. (USA: Penguin Books, 1976), 33.

⁴⁰ *Ibid*, 33.

⁴¹ C. J. Simister. *How to Teach Thinking and Learning Skills*. (London: Paul Chapman Publishing, 2007), 10.

goal is to prepare students living in the real life. After graduating from school, students do not only deal with the problems that they are familiar with, but also deal with the unfamiliar problems that need a solution. To be successful in life, prioritizing, decision making, strategizing and collaborative problem solving is needed.⁴² Moreover, the problem of life is more complicated because it deals not only with the book or formula but also with the society, law and tradition. Thus, it needs more than remembering all good solution from books or only understanding the problem, but it needs a creative solution that has been analyzed and reformulated. In the school, when the teachers only teach the knowledge, students cannot deal with a complicated problem. To solve a problem, decision and action are needed. Students need to use the knowledge and apply it that is helped by their good thinking skills.⁴³ Knowledge or information is used as the basic thing to think.⁴⁴ The more complicated is the matter, the way of thinking is higher. The thinking activities that are believed represent higher order thinking s skills are analysis, evaluation, problem solving and decision making. By teaching thinking skills, students are expected to be a good decision maker and problem solver. Higher order thinking skills need to be taught to students in order to enhance the quality of education.

After reviewing a little bit about the importance of higher order thinking skills, here is more discussion about what higher order thinking skills is.

a. Definition of Higher Order Thinking Skills

As the educational goal, higher order thinking skills need to be introduced to the students in order to prepare them facing the real problem. Many experts defined higher order thinking skills in many kinds of definitions. Krulik and Rudnick stated that there is four

⁴² Bhawani Prasad Mainali. "Higher Order Thinking In Education". *Academic Voices; A Multipedisciplinary Journal*. Vol. 2 No. 1, 2012, 5.

⁴³ Edward de Bono. *Teaching Thinking*. (USA: Penguin Books, 1976), 35.

⁴⁴ *Ibid*, 33.

level of thinking in general; recall thinking, basic thinking, critical thinking and creative thinking.⁴⁵ The thinking level that considered as higher order thinking skills are critical and creative thinking. FJ King, Ludwika Goodson and Farank Rohani, stated that higher order thinking skills include critical, logical, reflective, metacognitive and creative thinking.⁴⁶ In the journal “*Strategies for Improving Higher Order Thinking Skills in Teaching And Learning Of Design And Technology Education*” by C.C Chinedu added that analyzing information to distinguish the problem, evaluating the problem and creating new practical solution are involved as higher order thinking skills.⁴⁷ As the conclusion and simply define, higher order thinking skills are complex thinking skills; the thinking skills that use complex or multiple thinking activities. Further, the activity such as analysis, evaluate, decide a solution, solve a problem and be creative are the example of complex thinking skills. Those thinking activities use more than one thinking activity. Additionally, higher order thinking skills also showed in Bloom’s taxonomy in the 4, 5 and 6 level. Those are *Analyze, Evaluate, and Create*.

According to Susan M. Brookhart that defined higher order thinking skill in the simple definition, higher order thinking skills include (1) transfer, (2) critical thinking and (3) problem solving.⁴⁸ It will be defined one by one in the following discussion;

- 1) Higher Order Thinking Skill as Transfer.

⁴⁵ Weindy Pramita Ariandari. *Mengintegrasikan Higher Order Thinking* dalam Pembelajaran *Creative Problem Solving*. SEMINAR NASIONAL MATEMATIKA DAN PENDIDIKAN MATEMATIKA UNY 2015, 491.

⁴⁶ FJ King, Ludwika Goodson - Farank Rohani. *Higher Order Thinking Skills; Definition, Teaching Strategies, Assessment*. 1

⁴⁷ Chinedu, C.C, et.al., “Strategies For Improving Higher Order Thinking Skills In Teaching And Learning Of Design And Technology Education”. *Vol. 7, No.2/ December 2015/ ISSN 2229-8932 Journal of Technical Education and Training (JTET)* |36

⁴⁸ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 12.

Susan M Brookhart, take a conclusion from Anderson and Krathwohl in 2001 that learning for transfer is meaningful learning.⁴⁹ It is defined as learning that will be applied for students. Applied here means the students can use, transfer and explore the knowledge they got to the new situation. The condition that the students can relate their previous experience of learning to the new problem is meaningful learning.

2) Higher Order Thinking Skills as Critical Thinking.

Critical is taken from the ancient Greek word, Kritikos with meaning able to judge. J Butterworth added that even critical thinking is as judgment, it still needs basis called the knowledge.⁵⁰ In making a judgment, people do not only judge the thing but also need to know the basic knowledge of their judgment and provide the supporting reason.

Cited in the book *How to Assess Higher Order Thinking Skills in Your Classroom*, Norris and Ennis defined critical thinking as “reasonable, reflective thinking that is focused on deciding what to believe or do”. In critical thinking, students are asked to think more detail and critic to be wiser in deciding a thing. In *Critical Thinking Skills Development* book, Stella Cottrell stated that critical thinking is a wide range of skills and attitudes in a complex process of consideration.⁵¹ Specifically, Joe Y. F Lau explained that critical thinking can be seen by doing the following⁵² ;

- (1) Identify, construct, and evaluate arguments.
- (2) Formulate ideas succinctly and precisely.
- (3) Analyse problems systematically.

⁴⁹ *Ibid.*, 5.

⁵⁰ John Butterworth and Geoff Thwaites. *Thinking Skills; Critical Thinking and Problem Solving*. Second Edition. (Cambridge: Cambridge University Press, 2013), 7.

⁵¹ Stella Cottrell. *Critical Thinking Skills Development*. (PALGRAVE MACMILLAN, 2005), 2.

⁵² Joe Y. F. Lau. *An Introduction to Critical Thinking and Creativity*. (USA: Wiley), 2.

- (4) Identify the relevance and importance of ideas.
- (5) Understand the logical connections between ideas.
- (6) Evaluate the pros and cons of a decision.
- (7) Evaluate the evidence for and against a hypothesis.
- (8) Detect inconsistencies and common mistakes in reasoning.
- (9) Justify one's beliefs and values.
- (10) Reflect and evaluate one's thinking skills.

In sum, critical thinking is reflected by several thinking activities such as analyzing a problem, evaluating and reformulate the best solution and constructing an argument to support it. By teaching the critical thinking, students are expected to be able to give a logic reason, be reflective and be wiser judgment.

3) Higher Order Thinking as Problem Solving

A problem mostly defined as something that causes difficulty for people. In Oxford dictionary, problem defines as an unpleasant situation that needs to be overcome.⁵³ To deal with the problem, people need to have a solution. Be a good problem solver need to think in higher order level. Problem solving is known as the process of thinking that involves “a series of successive decisions, each of which depends on the outcomes of those that precede it”.⁵⁴ Further, cited in the book *How to Assess Higher Order Thinking Skills in Your Classroom*, Bransford and Stein classified problem solving skills into five stage process.⁵⁵ The five stages are called as IDEAL; identify the problem,

⁵³ Oxford Dictionary, (<https://en.oxforddictionaries.com/definition/problem> , accessed on 24th May, 2017)

⁵⁴ FJ King, Ludwika Goodson - Farank Rohani. *Higher Order Thinking Skills; Definition, Teaching Strategies, Assessment*. 16.

⁵⁵ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 99.

Define and represent the problem, Explore possible strategies, Act on the strategies and Look back and evaluate the effects of the activities.⁵⁶ By having the problem solving activity, students are expected to solve their problem to construct the best solution for themselves. Those IDEAL steps should be introduced to the students as one of the ways in facilitating higher order thinking skills.

b. Bloom's Taxonomy

As discussed above that Bloom's taxonomy also related to higher order thinking skills. In Bloom's taxonomy, teachers are helped by the classified cognitive domain to facilitate activity or assessment in higher order thinking level. *Analyze, Evaluate and Create* are cognitive domain level by Bloom that can perform higher order thinking level.

Before discussing more about Bloom's taxonomy, there are other cognitive taxonomies in education such as Marzano and Webb's Depth of Knowledge . Those taxonomies also categorize the cognitive process in several levels that are similar to Bloom but different in the term. Marzarano categorized cognitive process into four levels; 1) Retrieval, 2) Comprehension, 3) Analysis and 4) Knowledge Utilization. Then, Webb's DOK also classify cognitive process into four levels; 1) Recall and Reproduction, 2) Skill and Concept, 3) Strategic Thinking and 4) Extended Thinking. These frameworks or taxonomies (Bloom, Marzarano, and Webb's DOK) even have different name of each level, they have something in common. Those three taxonomy classified cognitive process from the simple to the complex thinking process. Further, Bloom's taxonomy is widely used in United State of America, while in Australia, New Zealand, Canada, and the United Kingdom used the SOLO taxonomy.⁵⁷

⁵⁶ *Ibid*, 99.

⁵⁷ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010). 42.

Furthermore, this research will only focus on Bloom's taxonomy that has been revised in 2001 by Lorin W. Anderson and David R. Krathwohl. The reason is that because Bloom's taxonomy is classified specifically. The six levels with 19 cognitive processes helped the educators to decide learning objective and assessment better in the learners' perspective. Additionally, the knowledge dimension and the cognitive process domain are categorized separately, so it is very useful for the teacher to construct learning objective. It is also stated by Anat Zohar that Bloom's taxonomy is categorized and specified the cognitive process in clear and succinct framework.⁵⁸ Further, the student teachers in State Islamic University of Sunan Ampel Surabaya are introduced to Bloom's taxonomy rather than the other two taxonomies.

Benjamin Bloom is the one who has a theory about the cognitive domain for categorizing a level of abstraction of questions that commonly occur in educational settings.⁵⁹ According to *A Revision of Bloom's Taxonomy; An Overview*, David R. Krathwohl said that the taxonomy of educational objectives is a framework for classifying statements of what we expect or intend to the students to learn as a result of instruction.⁶⁰ This concept of cognitive domain is released in 1956. The taxonomy is popular under the name Bloom's Taxonomy. Then, in 2001, Bloom's taxonomy is revised by David R. Krathwohl that has several changes that will be discussed later.

Furthermore, Bloom hoped by this idea, this could serve as a means for determining the compatibility of educational objectives, activities, and assessments in a

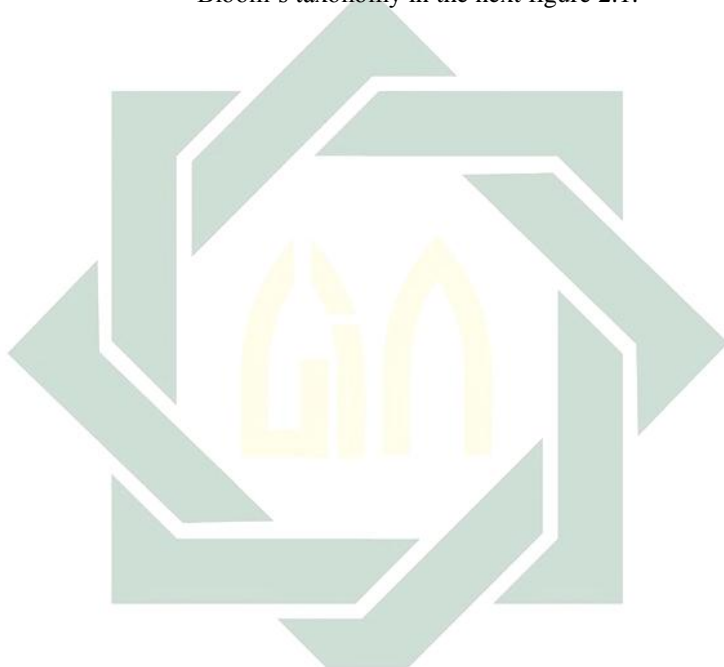
⁵⁸ Anat Zohar. *Higher Order Thinking in Science Classrooms: Students' Learning and Teachers' Professional Development*. (Springer Science + Business Media B.V, 2004), 1.

⁵⁹ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001).

⁶⁰ David R. Krathwohl. "Revising Bloom's Taxonomy". *Theory Into Practice*. (Autumn, 2002), 1.

unit, course or curriculum.⁶¹ Teachers usually use Bloom's taxonomy as the guideline in deciding learning objective and assessment in their lesson plan.

Bloom's taxonomy is categorized from the simple thinking skills to the complex one. Before knowing further about the revised version, here is the original Bloom's taxonomy in the next figure 2.1.



⁶¹ *Ibid*, 1.

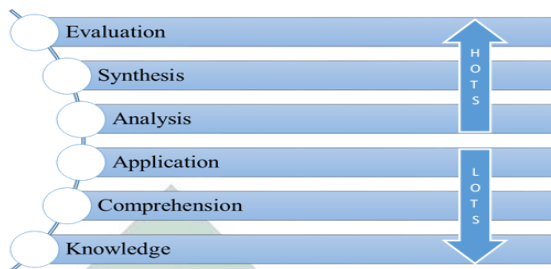


Figure 2. 1 Original Bloom's Taxonomy

In the figure 2.1, the *knowledge* is the lowest cognitive process, while *evaluate* is the highest or most complex thinking skills. Here are the definitions of each level of Bloom's taxonomy.⁶²

- 1) Knowledge refers to the recalling information in specific or universal, methods or process, and pattern or structure.
- 2) Comprehension refers to thinking process for understanding information.
- 3) Application is the ability to apply rules, principles, information, theories, or other abstractions for new and real situations.
- 4) Analysis is the ability to breakdown an information into its constituent elements or parts.
- 5) Synthesis is creating new creation by combining ideas from different sources.
- 6) Evaluation is judging the values of an idea or material for given purposes.

However, time to time this cognitive taxonomy has been modified or revised by David R. Kratwohl in 2001. The cognitive stages are not changed a lot, it is still similar to the original one. The changes are in the three aspects as explained by Anderson and Kratwohl;

⁶² L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 313-319.

in the emphasis, terminology and structure.⁶³ In the emphasis aspect, the revised version focuses more in applying taxonomy for curriculum and its useful for the teachers. It is also boarder and highlights more in the subcategories of each level.

Next, in the terminology aspect, the revised version uses a different term for each level. The words used become verb rather than a noun. It can be seen in the figure 2.2. The changes also happen for all subcategories for each level such as *Knowledge* becomes *Remember* with subcategories *Recalling and Recognizing*. The changes also happen to the *Comprehension and Synthesis*, these become *Understanding and Create*.

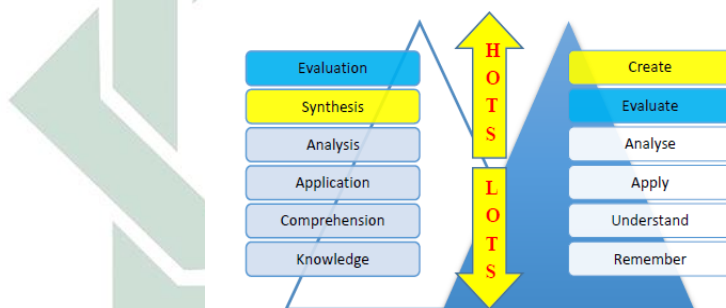


Figure 2. 2 Bloom's Taxonomy Revised Version

The last aspect that is structure, the revised version separates knowledge dimension with cognitive dimension. This taxonomy is two dimensional frameworks (*see table 2.1*). It is to differentiate noun-verb relation in learning objectives. The knowledge dimension is separated from the cognitive domain but still, it is interrelated. Teachers will use both knowledge and cognitive domain in creating learning objective. In the knowledge process, it is divided into

⁶³ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 305.

four dimensions; factual, conceptual, procedural and metacognitive. Also, the level number 5 (Synthesis/Create) and 6 (Evaluation/Evaluate) are interchanged in the order (*see figure 2.2*).

Table 2. 1 Knowledge and Cognitive Process Dimension

The Knowledge Dimension	The cognitive process dimension					
	Remember	Understand	Apply	Analyse	Evaluate	Create
Factual						
Conceptual						
Procedural						
Metacognitive						

However, the revised version uses the different term or word in labeling each level of cognitive domain. The definition of each level is still almost the same (*see table 2.2*). Further, each level will have action verbs that can reflect each thinking level. In the revised version, it is called as cognitive process. By having 6 levels, there are 19 cognitive processes. As the example, in the level 4, *Analyze* the activity that can be done by the students to show that their brain is analyzing a thing, the teachers might give task to differentiate between two things. In the table 2.2 below, it will show the definition and the cognitive process of each cognitive level.

This is the revised of Bloom's Taxonomy based on Anderson and Kratwohl;⁶⁴

Table 2. 2 Bloom's Taxonomy Revised Version

Cognitive Process Domain		
Category	Definition	Cognitive Process
Remember	(Regaining relevant knowledge from long-term memory)	Recognizing Recalling
Understand	(Determining the meaning of Instructional messages)	Interpreting Exemplifying Classifying Summarizing Inferring Comparing Explaining
Apply	(Carrying out or using a procedure in a given situation)	Executing Implementing
Analyze	(Breaking material, detecting how the parts relate to one another)	Differentiating Organizing Attributing
Evaluate	(Making judgments based on criteria and standards)	Checking Critiquing
Create	(Putting elements together to form a creation or make an original product)	Generating Planning Producing

⁶⁴ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 67-68.

Further, each cognitive process will be discussed more below.

1. Remember

In this level, the students are asked to retrieve the knowledge from their long term memory. The learning objective is to promote their retention for the new presented material with what they have taught.⁶⁵ For example, students are given the introduced task just to recall or recognize the same material that was taught. *Recalling and Recognizing* is included as the cognitive processes in this level. In the meaningful learning and problem solving, *remembering* knowledge is an important thing.⁶⁶ As the basic thing to think about, it is the knowledge.⁶⁷

Recognizing

Recognizing involves retrieving knowledge from long term memory in order to compare it with presented information.⁶⁸ In this cognitive process, students are asked to match or identify the new presented information with their previous knowledge. *Identifying* is the alternative term for *Recognizing*. In the assessment format, matching task, verification or mostly common example is true-false and multiple choice can be done in this cognitive process. The learning objective is that the students are able to recognize of a material.

Recalling

Recalling is retrieving relevant knowledge from long term memory when given a prompt to do so.⁶⁹ The prompt is mostly a question. As an example, “What is the generic structure of narrative text?” is a prompt that given to make students *Recalling* their long term memory. *Retrieving* is the alternative term for *Recalling*. In the assessment format, teachers can give

⁶⁵ *Ibid*, 66.

⁶⁶ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 66.

⁶⁷ Edward de Bono. *Teaching Thinking*. (USA: Penguin Books, 1976), 33.

⁶⁸ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 69.

⁶⁹ *Ibid*, 69.

little or more hints to the students. The example before is a question with no hints. The question with several hints are like this “In narrative text, _____, _____, and _____ are the generic structure of it.”

2. Understand

This level of cognitive domain is higher than *Remembering*. When the students already can remember the knowledge, then the students are expected to “transfer” or “relate” it to the new presented material. *Understand* is when the students are able to construct meaning from instructional messages, including oral, written and graphic communication.⁷⁰ Instructional messages here can be in time during lecturing, in computers or books.⁷¹ In this level, cognitive processes that include as *Understand* are *interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.*

Interpreting

This cognitive process happens when the students are able to change information from one representational form to another.⁷² *Interpreting* may involve converting or changing words to words (paraphrasing), picture to words, words to pictures, numbers to words, words to numbers, musical notes to tones, and etc. This will depend on the subject field of the students. The alternative terms for this are translating, paraphrasing, representing, and clarifying. In assessment format, *Interpreting* can be in open-ended question or in multiple choice format. As a reminder that the material or information representation in the task needs to be “new” for students, so the cognitive process will tap in the right *Interpreting something* rather than *Remembering* only.

Exemplifying

Exemplifying happens when the students are asked to give a specific example of a general concept or principle.⁷³ It involves

⁷⁰ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 70.

⁷¹ *Ibid*, 70.

⁷² *Ibid*, 70.

⁷³ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 71.

identifying the defining features of the general concept or principle and use those features to give an example. The alternative terms of this *exemplifying* are illustrating and instantiating. In the assessment format, it may be done by constructed response (open ended question) or selection response (multiple choice). In selection response, the students can be asked to give example of a procedure text by giving some choices.

Classifying

When *exemplifying* is the ability to find specific information from the general concept, *classifying* is the ability to find the general concept from the specific information. *Classifying* happens when the students are able to identify that this example or instance belongs to a particular concept.⁷⁴ In this cognitive process, the alternative terms that can be used are categorizing and subsuming. In the assessment format, it can be in a constructed response or selection response. In English, the example task of this cognitive process is that the students are asked to classify adjective into categories of using more or *–er* for comparison degree.

Summarizing

Summarizing occurs when the students suggest a single statement that represents presented information or abstract of a general theme.⁷⁵ Alternatives terms for *summarizing* are generalizing and abstracting. *Summarizing* involves constructing a representation (the meaning of a scene in a movie play) of the information and abstracting a summary from it (determining a theme or main points).⁷⁶ Students can be asked to write a summary from a given text or asked them to find the best title for a given passage. The assessment format of this task can be in constructed or selection response as well.

Inferring

⁷⁴ *Ibid* 72.

⁷⁵ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 73.

⁷⁶ *Ibid*, 73.

This cognitive process occurs when the students are able to find a pattern in a sequence of examples or instance.⁷⁷ The students are given a series of example or instance, then when the student can abstract the concept of given examples, the students are doing *inferring*. For instance, the students are given sets of example, “bigger, more beautiful, easier, more interesting, crazier”, the students are asked to think when they should add -*er* or more. The alternative terms used are predicting, concluding, extrapolating, and interpolating. In the assessment format, the teacher may use analogy tasks, oddity tasks, and completion tasks. When the students are given sets of item, then they are asked to guess what comes next, it is called as the completion tasks.

Comparing

Identifying the similarities or differences between two or more objects, ideas or problems is called as *comparing*.⁷⁸ Contrasting, matching, and mapping are used as the alternative terms for this cognitive process. In *comparing* two or more things, the task will ask students to find one correspondence between element and pattern in *a* thing to one correspondence in *another* thing.⁷⁹

Explaining

When the students are able to construct and use a cause-and-effect of a system, they are able to do *explaining*.⁸⁰ Another term to say is constructing a model. In using cause-and-effect, it is mostly in natural science or social science and humanities subject such as “Why does air enter a bicycle tire pump when you pull up the handle?”⁸¹ When it goes to English, the students may be given a sort of problem that asks them to give their opinion with supported argument. In *explaining* their opinion, they will give their explanation with the supported reason. It is

⁷⁷ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 73.

⁷⁸ *Ibid*, 75.

⁷⁹ *Ibid*, 75.

⁸⁰ *Ibid*, 75.

⁸¹ *Ibid*, 76.

because the ability of *explaining* includes reasoning, troubleshooting, redesigning, and predicting.⁸²

3. Apply

Apply is the ability to apply or use a procedure to perform an exercise or solve a problem.⁸³ In the other words, students are already known the procedure in the learning process, then they are asked to apply it. The cognitive processes included in this *Apply* level are *executing and implementing*. These cognitive processes mean the students may apply the knowledge for similar situation as exercise (*executing*) or the students apply the procedures to the new situation as problem (*implementing*).

Executing

When the students successfully carry or apply the procedures to the familiar task, it means the students are able to do *executing*.⁸⁴ The alternative terms to use is carrying out. In *executing*, the students may be asked to construct response or select response. The students may be given familiar task talking about *simple present tense*, then the students are asked to arrange the sentence to form simple present tense. This is simple carrying out information or procedures where the students know how to complete it.

Implementing

In contrast with *executing*, *implementing* is asking the students to use or apply the information or procedure for unfamiliar task.⁸⁵ In *implementing* task, the cognitive process that occurs may relate to *understand* and *create*. Unfamiliar task means the students do not know what to do, so, the students need to understand the problem first before solving it. For more complex cognitive process, the students may be asked to give a solution.

4. Analyze

⁸² L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 76.

⁸³ *Ibid*, 77.

⁸⁴ *Ibid*, 77.

⁸⁵ *Ibid*, 78.

“*Analyze* is breaking material into its constituent parts and determining how the parts are related to one another and to an overall structure.”⁸⁶ In this level, the cognitive processes followed are *differentiating*, *organizing* and *attributing*. These cognitive processes will be discussed more in the next discussion. *Analyzing* is the extension process of *understanding* and preamble before going to *evaluating* and *creating*.⁸⁷ The sequence of *understanding*, *analyze* then *evaluating* may occur repeatedly because they are interrelated.

Differentiating

Distinguishing the parts of a whole structure in terms of their significance is called as *differentiating*. This process happens when the students can determine the important from unimportant information, relevant from irrelevant information and attends to important or relevant information.⁸⁸ *Differentiating* is different from *comparing* in the *understanding* level. *Differentiating* is related to the structural organization.⁸⁹ Alternative terms for *differentiating* are selecting, distinguish, discriminating, and focusing. The students may be given a passage of a narrative text which they are asked to determine the major point of each paragraphs, such as the orientation, conflict and resolution. The assessment format may be designed in selection or constructed task.

Organizing

“*Organizing* involves identifying the elements of a communication or situation and recognizing how they fit together into coherent structure.”⁹⁰

The students can be said successfully doing *organizing* is when they can form systematic and coherent connection among some presented information. In this cognitive process, *organizing* can be occurred in relation to *differentiating* and *attributing*. The alternative terms used are outlining, integrating, finding

⁸⁶ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 79.

⁸⁷ *Ibid*, 79.

⁸⁸ *Ibid*, 80.

⁸⁹ *Ibid*, 80.

⁹⁰*Ibid*, 81.

coherent, structuring and parsing. The students may be asked to make an outline from a given text about analytical exposition. They are asked to make an outline and find the supported and unsupported argument for each paragraph. The assessment formats are the same as the other cognitive processes. The format task may use selection or constructed response.

Attributing

When the students are able to determine the intention or the point of author in the presented material, they can do *attributing*.⁹¹ *Attributing* is when the students discover or find out the values, biases, point of view or intention in communication.⁹² Deconstructing is another term of *attributing*. This cognitive process is different from *interpreting* process. When *interpreting* is to understand what the author is saying in presented material, *attributing* is beyond the understanding that determines the author's point of view of the presented material. For instance, the students are asked to determine the author's perspective in the reading passage, battle of Atlanta in the American Civil War.⁹³ The students are asked to determine whether the author supports the North or the South. The task format can be done in constructed or selection response. The point of *attributing* is that the students are able to determine the intention, the purpose or point of view of the author in presented material.

5. Evaluate

Making judgments based on criteria and standards is the definition *evaluate*.⁹⁴ Then, in making judgment, it's not only judging without any basis. There is a standard or criterion for judgment such as quality, efficiency, consistency, and effectiveness. The standard may be in quality or quantity. Since *Evaluate* or judge a thing may be happened in many cases, they are not always in *Evaluate* thinking process. For example, the

⁹¹ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001, 82.

⁹² *Ibid* 82.

⁹³ *Ibid*, 82.

⁹⁴ *Ibid*, 83.

students may give judgment whether these two texts are similar or not. However, the *evaluate* process, may happen in such question, “Is the method the best way to achieve goal?”⁹⁵ The point of *evaluate* is that students make judgment by having certain criteria or standard. In this level, *evaluate* includes cognitive processes; *checking* and *critiquing*.

Checking

Testing internal inconsistency or fallacies in an operation or a product is called as *checking*.⁹⁶ Meaning that, when the students are asked to check the argument in analytical exposition to support or disconfirm the thesis statement. The alternative terms for *checking* are coordinating, monitoring, detecting and testing. In the task, the students may be asked to check whether the paragraphs in a text support the conclusion or not. In this cognitive process, the main point of *checking* is to test the internal inconsistencies of presented material.

Critiquing

In contrast with the *checking*, *critiquing* focuses on the external product with criterion or standard. In this cognitive process, the students are asked to judge the product on externally based criteria and standards.⁹⁷ Judging is the alternative term for *critiquing*. Therefore, in judging or *critiquing* a product or presented material, the critical thinking occurs. The students may be given passage of a problem with the solution. The students are asked to make a judgment to be positively in supporting the solution or disagree with the solution given. The assessment format is better in constructed response where the student can give expanded explanation.

6. Create

Create is believed as the most complex cognitive process as it is in the highest level of Bloom’s taxonomy. Some elements that are put together into a coherent or functional form of whole are

⁹⁵ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001). 83.

⁹⁶ *Ibid*, 83.

⁹⁷ *Ibid*, 84.

known as *create*⁹⁸. In doing *create*, the students also use their previous learning experience to promote *create*. Additionally, in creating something, usually it is related to the creativity and uniqueness or originality. When the teachers ask the students to create a product, they should know the students' uniqueness. Creativity usually can be seen as the unusual product, but when *creating* is an objective, the teachers need to think about what the students can and will do.⁹⁹ However, *create* do not only depend on the uniqueness. Point of *create* is that the students can synthesize the material into a whole.¹⁰⁰ *Create* is different from *understand, apply or analyze*, in this level the students are asked to do task where they put some material from many references into a whole. The cognitive processes that included here are *generating, planning and producing*. Those cognitive processes are related to the how the students can provide multiple solutions for a problem by planning the action first then executing it.

Generating

Demonstrating problem and arriving at alternatives or hypothesis that meet certain criteria is included as *generating*.¹⁰¹ When the students are asked to give different solutions, the students will use their creative thinking to formulate it. The cognitive processes are still interrelated as well as *generating*. In other cognitive process levels, *understand* also includes *generating*. However, the purpose of *generating* is divergent or various possibility which *understand* focuses on single possibility. Also, the other term used for this is hypothesizing. In line with the purpose of *generating*, the students are given description problem then asked them to produce the hypothesis. The assessment format will be in constructed response. It will help the students to produce as many as possible alternatives towards the problem. In English learning, usually the students are introduced how to give suggestion. Here, the teachers can provide description of problem, then asked the students to give

⁹⁸ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001). 84.

⁹⁹ *Ibid*, 85.

¹⁰⁰ *Ibid*, 85.

¹⁰¹ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 86.

some possible suggestions; “What are possible suggestion to Anna’s problem?”

Planning

“*Planning* involves devising a solution method that meets a problem’s criteria, that is, developing a plan for solving the problem.”¹⁰²

Planning is also called as designing. This is happened when the students plan or design the solution in *generating* process. In solving the problem, the students will break a task into sub tasks that will be performed.¹⁰³ This step sometimes is skipped by the teacher because it is actually implicit in *producing* process. When the students produce the solution, the students actually have already planned the detail to do the solution. Additionally, in this cognitive process, the students are expected to plan or design the solution method before producing or executing the solution in solving problem. In *planning*, work-out solution, describe solution plans, or select solution plans for presented problems can be given to students as their task.¹⁰⁴

Producing

Constructing is another term of *producing*. Carrying out the plan in solving problem that meet certain criteria is included as *producing*.¹⁰⁵ In *producing* process, the students can apply all type of knowledge (factual, conceptual, procedural and metacognitive knowledge). Here, the students are asked to create or produce a product based on the description criteria or requirement. For instance, the students are asked to make a short story based on the requirements of recount text. Additionally, when the students are asked to perform a drama, the students will also do *producing* when they are asked to design the sets of drama.

Specifically, this study only focuses on higher order thinking skills which is reflected in the level 4, 5,

¹⁰² *Ibid*, 87.

¹⁰³ L. W. Anderson, et.al., *A Taxonomy For Learning, Teaching And Assessing*. (New York: Longman, 2001), 87.

¹⁰⁴ *Ibid*, 87.

¹⁰⁵ *Ibid*, 87.

and 6 of Bloom's taxonomy. Further, the cognitive process that included in the table will be more specific and limited (*See table 2.3*). When the cognitive processes are reflected into learning objectives, the teachers make it operational. The cognitive processes are broken down into several action verbs that show the cognitive process level. In this study, the researcher will focus on the cognitive process based on Bloom's taxonomy.

Table 2. 3 Cognitive Processes

Verbs that show Analyze level	Verbs that show Evaluate level	Verbs that show create level
Differentiating (Discriminating, Distinguishing, Selecting) Organizing (Finding coherence, Integrating, Outlining, Structuring) Attributing (Deconstructing)	Checking Critiquing (Judging)	Generating (Hypothesizing) Planning (Designing) Producing (Constructing)

Those verbs will be so helpful in identifying task item in higher order thinking skills. When the learning objective is having the students can creating a product based on the description criteria, and the task also in line with it, meaning that the teachers facilitate the students to think in higher level; in the level of *create (producing)*.

2. Assessment

According to H. Douglas Brown, assessment is defined as ongoing process that includes wider domain.¹⁰⁶ Ongoing process here is the learning process, while wider domain here means that assessment includes testing, measuring and judging. Assessment is also the way of

¹⁰⁶ H. Douglas Brown. *Language Assessment*. (USA: Longman, 2004), 4.

collecting or gathering the information about the students' understanding to decide the next step in the learning process. Assessment for learning also provide feedback to help the students improve and achieve the learning objective. This is the reason why assessment is a crucial process in education.¹⁰⁷ Assessment can be done in the formal or informal way. In the formal way, the assessment is usually a test. For informal assessment, it can be seen while the learning process is ongoing; the students answer the question, or practice new structure, give a comment.¹⁰⁸ In the *Authentic Assessment for English Language Learners*, there are at least 6 purposes of assessment for ELL students:¹⁰⁹

- 1) Monitoring student progress: to review student language skills in classroom.
- 2) Screening and identification: to identify qualified students for special language and/or content area in a supporting program.
- 3) Reclassification or exit: to determine the language proficiency and content area competencies needed to benefit from instruction in grade-level classroom.
- 4) Program evaluation: to determine the effects of instructional programs.
- 5) Placement: to determine the language proficiency and content area competencies of students.
- 6) Accountability: to guarantee that students achieve expected educational goals or standards, including testing.

Task is also one of techniques in giving assessment. Task is defined as any language learning effort for promoting students to manipulate, master, and/or produce the target language as they perform some set of

¹⁰⁷ Centre for Educational Research and Innovation. *Assessment for Learning; Formative Assessment*.

¹⁰⁸ H. Douglas Brown. *Language Assessment*. (USA: Longman, 2004), 4.

¹⁰⁹ J. Michael O' Malley - Lorraine Valdez Pierce. *Authentic Assessment for English Language Learners*. (California : Longman, 1996) , 3.

workplans.¹¹⁰ It means that any exercise or activity that given to students in gaining their knowledge. In this study, a task is focused on the exercise or written test that given to the students in the classroom. Written test includes multiple choices, fill in the blanks, short and long answer, matching, true false, descriptive task and so on.¹¹¹ Additionally, in this study, the analyzed task will be focused only on the task or exercise that is designed with the rubric assessment. This is used to make differences between activity to enhance or explore students' knowledge and the task to assess the learning process. Moreover, the student teachers will successfully interpret *indicator* or learning objective if they design the task in line with their learning objective.

In designing task to assess the students, there are guided principles to design good assessment. Good assessment will lead to good outcomes that is used as useful information in deciding the next step in the learning process. The basic principles stated simply in three principles of Susan M. Brookhart. The number of principles can be added more to five as in H. Douglas Brown or ten as in David Nicol's study. H. Douglas Brown explained further that assessment is too complicated to be simplified into five principles.¹¹² The number of principles somehow is not really matter because it can be simplified or added based on the situation.¹¹³ The different number of principles are actually include the same important point. Since three basic principles of Susan M. Brookhart already include all main principles, this three basic principles can be used as the guidelines as well.

¹¹⁰ Foreign Language Teaching Methods; Speaking. *Lesson 3: Designing Communicative task*. (<http://www.shanghairanking.com/wcu/wcu1/Tai.pdf>, accessed on February 22nd, 2017)

¹¹¹ Nur Amalia Fadhlila. Undergraduated Thesis; "*Students Teachers' Ability in Designing Assessment Instrument at English Teacher and Education Department UIN Sunan Ampel Surabaya*" (Surabaya: UIN Sunan Ampel, 2015), 17.

¹¹² H. Douglas Brown. *Language Assessment*. (USA: Longman, 2004), 30

¹¹³ John Norcini. "Criteria for Good Assessment; Consensus and Recommendation from the Ottawa 2010 Conference". *Medical Teacher*. Vol.33. 2013, 206.

a. Basic Principles of Constructing Assessment

1. Specify clearly and exactly what you want to assess

Check the learning objectives that want to be assessed. It is to make sure that the learning objective is specific and clear. The learning objective needs to be specific and clear in term of what task that students need to do. As H. Douglas Brown explained that the first thing to do for measuring an effective classroom test is doing identification of objectives.¹¹⁴ The assessment need to be relevant or in line with the learning objectives. For instance, the assessment in the type of task needs to tap in the right point as in the learning objective. It will be good if the learning objectives perform operational verb and clear target language.¹¹⁵ Using operational verb in objectives will help the teacher in measuring that objectives; the objectives can be tested. Brown gives example good objectives that provide operational verb and clear target language as *student will produce yes/no questions with final rising intonation.*¹¹⁶

Further, specifying the type of performance or task that the student will do is also important. Test specification for the assessment means it should have a structure based on the lesson.¹¹⁷

2. Design tasks or test items that require students to demonstrate this knowledge or skill

Making sure that the assessment does call forth from students the desired knowledge and thinking skills.¹¹⁸ The assessment provide certain stage of cognitive process and directly tapped students' ability. This means that the assessment need to tap the right ability as in the learning objective. For example, the learning objective is *students will be able to interpret*

¹¹⁴ H. Douglas Brown. *Language Assessment*. (USA: Longman, 2004), 32.

¹¹⁵ *Ibid*, 33.

¹¹⁶ *Ibid*, 32.

¹¹⁷ *Ibid*, 33.

¹¹⁸ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 19.

poems.¹¹⁹ Then, the students are asked to answer some questions dealing with selecting the right name of the author, identifying the rhyme of the poems, and producing new poems. However, the assessment will not tap the students' ability if the test item asks the students to do so. It will go to *remember*, *apply* and *create* in the Bloom's taxonomy level. While interpreting here goes to *evaluate* level of Bloom's. The right one for students to do task is asking the students to interpret the poem based on their point of view.

Providing rubric for scoring is also important. It is needed to interpret or reflect the students' work. The point or score for each criterion should be reflected on the task item. The point for each task item is different depending on the task level; difficulty or complex. The easy task item will have lower point rather than the difficult task item.

3. Decide what you will take as evidence of the degree to which students have shown this knowledge or skill.

After getting the students' work, what will the teacher do next? It will be based on the function of the assessment that the teachers planned. If it is formative assessment, then feedback is needed. This task in assessment is used for learning. If it goes to summative assessment, teachers need to design a scoring rubric to see and reflect their degrees of achievement.¹²⁰

After designing a task by considering those three principles or guidelines, it may be considered as a good task. Yet, it may not provide higher order thinking skills. As discussed before that higher order thinking skills will be reflected in the cognitive level of *analyse*, *evaluate* and *create*. The task that cannot facilitate higher order thinking skills will not facilitate the students to think critically and creatively. In

¹¹⁹ *Ibid*, 19.

¹²⁰ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 24.

facilitating higher order thinking skills in the form of task, another further principles or criteria need to be done. The principles come from Susan M. Brookhart as further action. If Bloom's taxonomy helps categorizing the learning objective and assessment, these principles helps teachers to design tasks in facilitating students to think in higher level of thinking.

b. Principles of Constructing Task in Higher Order Thinking Skills

1) Use introductory material.

It means allowing the students to use resource materials; gives students something to think about.¹²¹ Before going to the question, the teachers provide stimulus by giving something to think about. The resource material that can be used are pictures, table, diagram, passages or text such as poem or poetry and short movie or video. Narration, sort of problem or lyric of song are also included. Introductory material used to make students think about the answer out of their book. Introductory material might be in the type task of multiple choices or interpretive exercises, essay and performance task. Constructed response such as essay will ask the question to give response, comment or opinion. Additionally, performance task will ask the students to extend or show their knowledge and skills.

By providing resource material in the task item, the teachers are asked to design question that can challenge the students. The tasks need to challenge the learners to think logically, be innovative, be open-minded, and use imagination.¹²² Resource material is also well combined with open ended or essay task item. Task item that asks the

¹²¹Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 25.

¹²² ACARA Australian Curriculum Assessment and Reporting Authority.

(<http://www.australiancurriculum.edu.au/GeneralCapabilities/critical-and-creative-thinking/introduction/critical-and-creative-thinking-across-the-curriculum> , accessed on 27th February, 2017)

students to give comment or opinion and logic reason or explanation will also facilitate students to think in higher level.

2) Use novel material

Novel material here means given material that is not familiar or had already given to the students in the learning process.¹²³ This means that the task provides something new to think about. The content or target language is still the same as the learning process, but the different will be in the theme chosen, passage or new problem to solve. It will facilitate them to think in higher level because they will apply and generate the knowledge given in the task to the new situation or problem. The material that had already given in class discussion do not need to be re-use in the task item. If the given ask provides the same or introduced material, it will only lead the students to recall their past material. Meaning that the students will not be facilitated the higher order thinking skills.

If the teachers don't train the students to think in higher order level, the students may always say "*we never learn this, Mam/Sir*". Therefore, the solution may be done is that the teachers need to facilitate the students to think critically in the learning process. The teachers may give material to students that is designed with several questions to think in the taxonomy number 4, 5 or 6; *Analyse, Evaluate, and Create*. Thus, in doing their task, the students will not be confuse with the complex task item.

Further, teachers are better to provide blueprint or rubric to reflect students' result. The rubric will be different from the rubric for usual task. In providing rubric in higher order thinking skills, the rubric must be clear in assessing the students' thinking skills. The examples will be shown in the figure 2.4.

As the introductory material, novel material can be in variety of test such as multiple choices, open ended question, and performance task. The key is actually on the

¹²³ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 25.

question that need to be in higher order thinking level. In the book *How to Assess Higher Order Thinking Skills in Your Classroom*, gives example of test item that facilitates higher order thinking skills in the figures below.¹²⁴

Androcles and the Lion

Once upon a time, a slave escaped from his master. The slave's name was Androcles. He ran into the forest and came upon a lion in distress. The lion was lying down, moaning in pain. Androcles started to run away, but the lion did not run after him. Thinking that strange, Androcles turned back. As he approached the lion, the great beast put out his paw. Androcles saw that the paw was swollen and bleeding from a huge thorn that had become embedded in it. Androcles pulled out the thorn and bandaged the lion's paw. Soon the lion was able to stand, and licked Androcles' hand like a dog. The lion took Androcles to his cave, where Androcles could hide from his master, and brought him meat to eat each day. All was well until both Androcles and the lion were captured. Androcles was sentenced to be thrown to the lion, who had not been fed for several days, as an entertainment in the arena. Many people, including the emperor, came to see the spectacle. The lion was uncaged and, eagerly anticipating a meal, charged into the arena, where Androcles was waiting. When the lion approached Androcles, however, he recognized his old friend and once again licked Androcles's hand like a dog. The emperor was surprised, summoned Androcles, and asked how this could be so. Androcles told the emperor about coming upon the lion in the forest, caring for his paw, and living in his cave. Upon hearing the tale, the emperor pardoned Androcles and freed both Androcles and the lion.

Multiple-choice question to assess reasoning about the theme

1. The theme of Aesop's fable "Androcles and the Lion" can be expressed as "Gratitude is the sign of noble souls." Choose the plot detail that best expresses the theme.
 - A. The emperor ordered Androcles to be thrown to the lion.
 - *B. The lion did not eat Androcles.
 - C. Androcles pulled the thorn from the lion's paw.

Figure 2. 3 Example of Multiple Choice Task

On the figure 2.3, it shows that multiple choice can be used in facilitating higher order thinking skills as well. The resource material in the form of fable is also provided to think about. Rather than asking the students to select the

¹²⁴ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 27.

right answer about the name of the main character or question related to comprehension and remembering information, the students are asked to choose the plot detail that reflects best the theme.

Brief essay question to assess reasoning about the theme

2. The theme of Aesop's fable "Androcles and the Lion" can be expressed as "Gratitude is the sign of noble souls." Explain how the fable expresses this theme.

CRITERIA for feedback or rubrics:

- Appropriateness of details from the fable.
- Soundness of reasoning and clarity of explanation.

Performance assessment to assess reasoning about the theme

3. The theme of Aesop's fable "Androcles and the Lion" can be expressed as "Gratitude is the sign of noble souls." Write an original fable expressing the same theme. Then explain how the theme applies in a similar way to both "Androcles and the Lion" and your own fable.

CRITERIA for feedback or rubrics:

- Appropriateness of original fable to Androcles theme.
- Soundness of reasoning and clarity of explanation.
- Appropriateness of evidence from both fables.
- Writing conventions.

Figure 2. 4 Example of Open-ended Response and Performance Task Item

Those examples explain that the task item in higher order thinking skills can be designed in the variety of types; multiple choice (*see figure 2.3*), essay or performance task. Essay task will ask the students more; to give their reason or opinion rather than only select the correct answer.

Moreover, the blueprint or rubric is needed for the essay and performance task. It will be different based on the thinking skills and target language that is assessed. As discussed above that the task item in higher order thinking level will ask the students to *Analyze, Evaluate and Create*. The blueprint will deal with how the students can give opinion or reason and support it with logic explanation or

evidence. The rubric criteria for assessing thinking skills will be different from assessing writing or speaking skills. To assess thinking skills that deals with the main idea or logic reasoning, the criterion is about how the students construct the idea and how they support argument with evidence.¹²⁵ Further, those criteria may be specified into the appropriateness of the evidence and the clarity of idea or reason. It can be seen in the figure 2.4. Then, when it goes to assess product of the students, the criteria may deal with the creativity of the students since productivity is about creative thinking.¹²⁶

3) Manage cognitive complexity and difficulty separately.

People usually mislead between difficulty and complexity level. The teachers need to distinguish between level of difficulty (easy versus hard) and level of thinking (lower versus higher order thinking).¹²⁷ Difficulty level will be based on the effort of students to do the task, while complexity level will be based on the kind of thinking to do the task. The first taxonomy Bloom, recall can be in easy or difficult question. So, the teachers need to realize that question in higher order level can be designed in easy and difficult as well.

The question need to be clear in facilitate higher order thinking skills. As explained before, the level higher order thinking skills is in *analyse, evaluate and create*. In those each level of thinking, many instructions or questions can be asked to the students. As Bloom's Taxonomy revised version, *create* has three cognitive processes that are planning, producing and generating.

The table in the table 2.4 below will give example of the differences easy versus hard question with higher order thinking questions based on Brookhart's book.¹²⁸

¹²⁵ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 43-49.

¹²⁶ *Ibid*, 125.

¹²⁷ *Ibid*, 17.

¹²⁸ Susan M Brookhart. *How to Assess Higher-order thinking skills in your classroom*. (United States of America: ASCD Publication, 2010), 30.

Table 2. 4 Examples of Difficulty and Complexity Task Item

	Easy	Difficult
Recall	Who is the main character in <i>The Cat in the Hat</i> ?	Name all the characters in <i>Hamlet</i> .
Higher-Order Thinking	Why do you think the Cat cleaned up the house on his way out, before Mother got home?	Hamlet wrestles with a major question in his soliloquy, "O, that this too, too solid flesh would melt" in Act 1, Scene 2, Lines 131–161. What is the question in his mind, and how do you think he resolves it by the end of his soliloquy? State your interpretation of his major question and his resolution, and use evidence from the speech to support it.

In the Figure 2.5, the question in *recalling* and higher order thinking is different in the cognitive process. Higher order thinking question needs complex thinking as in the example; easy or difficult question. It can be shown here that lower order thinking and higher order thinking question can be designed in the easy or difficult level of question. The effort of answering the question is the matter. The easy *recalling* question only asks one main character in *The Cat in the Hat*, while in the difficult *recalling* question, it asks all the characters in *Hamlet*. It also happens as in the higher order thinking question above (see figure 2.5). The effort in answering the difficult higher order thinking level is more than the easy higher order thinking question.

B. Previous Studies

Related to this research, several previous studies are already conducted. The first study is from Risalatil Umami under the title *Students' Ability in Constructing Reading*

Question Items in Critical Reading Class in 2015.¹²⁹ Here, this study measures the students' ability in constructing reading question based on cognitive level of bloom's taxonomy. This study uses descriptive qualitative approach. This study measures the level of question students made for all six taxonomy of Bloom which is the result shows that create level is very low. Further, this study focused only the students' ability in creating higher order thinking skills. The teachers' ability to assess and create higher order thinking it self are not discussed yet.

The next study comes from C.C Chinedu, Y. Kamin and Olabiyi O.S under the title *Strategies for improving Higher Order Thinking Skills in Teaching and Learning of Design and Technology Education*. Here, it shows that the use of concept, interferences, visualization, and scheme can be good strategy to improve their higher-order thinking skills.¹³⁰ This study focused on the strategy used by the teachers for improving higher-order thinking skills of students in Design and Technology Education.

Another recent study is under the title *Student Teachers' Ability in Designing Assessment Instrument at English Teacher and Education Department UIN Sunan Ampel Surabaya* in 2015.¹³¹ Here, Nur Amalia Fadila focused on the level of students' ability in designing assessment instrument and the weaknesses of the students. The assessment instrument or technique here are multiple choice, descriptive questions, short answer, fill in the blank, matching and true and false.

The study from Yee Mei Heong, Widad Binti Othman, Jailani Bin Md Yunus, Tee Tze Kiong, Razali Bin Hassan, and Mimi Mohaffyza Binti Mohamad "The Level of Marzano Higher Order Thinking Skills among Technical education

¹²⁹ Risalatil Umami. Thesis: "*Students' Ability in Constructing Reading Question Items in Critical Reading Class*"(Surabaya: UIN Sunan Ampel Surabaya, 2015)

¹³⁰ C.C Chinedu, et.al., "Strategies for improving Higher Order Thinking Skills in Teaching and Learning of Design and Technology Education". *Journal of Technical and Training*. Vol.7 No. 2. December 2015, 35.

¹³¹ Nur Amalia Fadila. Thesis: "*Student Teachers' Ability in Designing Assessment Instrument at English Teacher and Education Department UIN Sunan Ampel Surabaya*". (Surabaya: UIN Sunan Ampel Surabaya, 2015)

Students comes as the forth study. Yee Mei Heong and friends focused on the level of higher order thinking based on Marzano theory instead of using Bloom theory. This study is quantitative as the questionnaire used as the data collection method. Marzano identifies 13 kinds of higher order thinking skills; comparing, classifying, inducing, deducing, error analysis, constructing supporting, analyzing perspectives, abstracting, decision making, investigation, problem solving, experimental inquiry, and invention. Further, the finding shows that the sample of the technical students has moderate level for 7 kinds of higher order thinking skills, and 6 others are in low level of higher order thinking skills.

As the last study, Nur Rochmah Laily and Asih Widi Wisudawati from Islamic State University of Sunan Kalijaga Yogyakarta conducted “*Analisis Soal Tipe Higher Order Thinking Skill (HOTS) Dalam Soal UN Kimia Rayon B Tahun 2012/2013*”. This study used non-test and Focus Group Discussion (FGD) technique. As a result, the characteristic of National Examination question in multiple choices is as stimulus which the skills of critical and creative thinking still cannot be concluded.¹³²

In general, previous studies of higher order thinking skills focused on the strategy to promote higher order thinking skills in learning process. Also, one of the studies focuses on higher order thinking skills based on Marzarano taxonomy rather than Bloom’s taxonomy. Therefore, this research will focus on how the students provide the assessment of higher order thinking skill.

¹³² Nur Rochmah Laily - Asih Widi Wisudawati. “Analisis Soal Tipe Higher Order Thinking Skill (HOTS) Dalam Soal UN Kimia Rayon B Tahun 2012/2013”. *Kaunia*. Vol.11 No.1, April 2015. 28