

Improving Critical Thinking among Junior High School Students through Assessment of Higher-Level Thinking Skills

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Abstract—Thinking is a natural process that is included in a cognitive process. The cognitive process will form a mental activity in order to gain knowledge and critical thinking of students. The ability to think critically can build meaningfulness in the social studies learning process. Critical thinking is always associated with high-level thinking skills which is always marked by careful analysis of students and consideration. The thinking level of students can be categorized into *higher order thinking skills (HOTS)* and *low order thinking skills (LOTS)*. In the learning process, high-level thinking skills (HOTS) are skills that must be present in every teaching. *Higher order thinking skills* are important aspects that students must have so they need to know the skill level. The application of *Higher order thinking skills* in the learning process will be able to improve the quality of students and the quality of education especially in social studies subjects that are always related to social problems in the surrounding environment, so that this ability is needed. Thus, a need analysis is necessary to see the importance of *higher order thinking skills* in the learning process, especially in social studies learning. The 21st century learning emphasizes *higher order thinking skills* that prioritize the ability to analyze, evaluate, and create. In bloom taxonomy, which means at level (C4), (C5), and (C6). The method in this study is library research or literature review.

Keyword— *Critical Thinking, higher order thinking skill (HOTS)*

I. INTRODUCTION

Teachers are professionals who have many important roles in the world of education. Even the teacher is also mentioned as an agent of change. As professionals, teachers have important functions, roles and positions to create quality education. The world of education is now entering the 21st century, in which as a young generation, especially students are required to have high-level thinking skills (HOTS). It aims that students can compete with other students. The process of thinking is a natural process that is included in a cognitive process. The cognitive process will form a mental activity in order to gain knowledge and critical thinking of students. The ability to think critically can

build meaningfulness in the process of social studies learning in accordance with the objectives of social studies learning in the number 58 of Ministry of Education Regulation 2014[1].

Critical thinking is always associated with higher order thinking skills. With high-level thinking, students are trained to be able to learn to solve problems, especially in working on the questions given and the problems faced in the future. In the high-level thinking process, students also show aspects of understanding information and reasoning, not just memorizing the subject matter but can also recall that later can be poured into the students' ideas. It is always characterized by means of a careful analysis of learners and consideration. The level of thinking of students can be categorized into higher order thinking skills (HOTS) and Low Order Thinking Skills (LOTS). The process of learning High-Level Thinking Skills (HOTS) is skill that must be present in every teaching.

But the fact is that such things cannot be presented in the learning process. There are still many students who have not been trained in high-level thinking skills (HOTS). It cannot be denied that students' thinking ability is still low, especially in high-critical and critical analysis questions. Therefore, students tend to be afraid to face the National Examination. It is due to lack of training in the handling of questions that require high analysis or questions in the HOTS category. Such conditions lead to low student achievement in Indonesia. It is proven by data from PISA in 2012 showing Indonesian students ranked 64th with a score of 396 (OECD average score of 496) [2].

PIRLS and PISA data, especially in reading comprehension skills, indicate that the competence of Indonesian students is relatively low [3]. Higher order thinking skills are important aspects that students must have so they need to know the skill level. The application of Higher order thinking skills in the learning process will be able to improve the quality of

students and the quality of education. Higher order thinking skill learning prioritizes the ability to analyze, evaluate, and create or in bloom taxonomy, which means at levels (C4), (C5), and (C6). In social studies learning questions, the ability to analyze, evaluate, and create is very applicable, for example, presented a description of a problem that is being discussed and students can analyze and provide solutions to these problems.

Hence, indirectly high-level thinking skills can be trained in students. Higher order thinking skills can develop the ability to solve the problems (problem solving), critical thinking skills (critical thinking), creative thinking (creative thinking), argued ability (reasoning), and the ability to make decisions (decision making). Especially in social studies subjects that are always related to social problems in the surrounding environment, so that this ability is needed. According to it is stated that higher order thinking skills (HOTS) include critical thinking and creative thinking [4]. Therefore, critical thinking used to problems solving. Based on this, the teacher must train students to think higher (HOTS).

It is important because according to the [5] training students HOTS is a curriculum goal contained in the Basic Framework and Structure. of Senior High School / Islamic Senior High School Curriculum and demands for teachers listed in the Competency Standards for Primary and Secondary Education Graduates. Higher order thinking skills themselves are also important that can help students in facing the National Examinations which are usually questions given in the HOTS category. Therefore, higher level thinking should already have to be applied in the learning process. Thus, an analysis is needed to see how important the higher order thinking skills (HOTS) of students which are in the learning process, especially in relation to social studies learning.

II. CRITICAL THINKING SKILLS

Critical thinking is a term that is always related to the way a person thinks. How does someone think whether in a low or high level? The ability to think critically is always characterized by careful analysis and consideration. Every person who has entrusted the educational institution as a place in gaining knowledge will surely expect the students in it to have critical thinking. The critical thinking process must be possessed by every student especially when learning activities. Today's learning process involves more students to play an active role in learning activities.

Hence, it can encourage students' critical thinking skills.

The ability to think critically involves students to be able to see the conditions of the surrounding problems and can provide an analysis of these problems. In connection with this it is also explained that critical thinking skills that are trained in each stage of problem solving contribute to identifying problems, expressing solutions, evaluating solutions, and solving problems using the specified solution [6]. The critical thinking process always teaches students to have skills in problem solving. The problem-solving ability, for example, students can gather various information and then make an analysis of evaluative conclusions from various information [7].

The ability to think critically is the ability of a person's way of thinking well and clearly about a problem that includes six aspects, namely aspects of interpretation, analysis, evaluation, conclusion, explanation, and self-regulation. (self-regulation) [8]. Someone who has had critical thinking consistently in his life always has rational, sufficient, and empathetic thinking. People who think critically will learn when faced with problems. Therefore, with critical thinking, it will encourage in solving the problem. Like for example a student who thinks critically when given a high-category problem, the student will look for ways to solve the problem.

The learning process that emphasizes critical thinking will have a positive impact as students are taught to dare to speak in terms of fish opinions or ideas. Besides, the learning objectives are directed and clear. Learning that prioritizes the ability to think critically will provide direction and goals of students' thinking and can help students in determining the relationship with one another more accurately [9]. Every student has different potential to continue to grow and develop into a critical thinker.

Critical thinking is not something that is difficult to practice, and it does not belong to people who have high intelligence (IQ) only, but critical thinking can be done by anyone who has both high- and low-level intelligence [10]. Basically, critical thinking can be explored so that it will form into a person who has critical thinking depending on how the individual can explore the potential of his thinking. Students not only gain knowledge in the classroom but the results of knowledge in the classroom can be applied in the environment as a form of the critical thinking process. This effective and reliable mental process can

also be used to pursue relevant and correct knowledge about the world that students may not yet know about.

Critical thinking skills can be fostered by the openness of new ideas, high trust, and being able to learn from mistakes and failures. Hence, one of the most effective ways to develop creative skills is through challenging projects or tasks so that it can generate creative ideas from students to find solutions to the problem of tackling the real world [11]. Whatever learning activities are attempted, critical thinking skills of students are always presented. The right learning strategy from the teacher can develop the process of critical thinking of students. Such problem-based learning (PBL), simulation, and concept mapping seem to be the most commonly used educational interventions to promote the development of critical thinking.

The success of critical thinking skills is determined by the way teachers teach. According to Smyth, it is known that passive learning methods will limit the development of students' critical thinking. Just as if learning is only teacher-centered, it will result in the development of students' critical thinking skills [12]. Students will feel just listen to the teacher in front explaining the consequent process of independence of students is not there, lack of mastery of the concept, lack of developing attitudes and morals. Proven by the various facts that occur, students will find it difficult to get good grades in the final exams which are only low scores obtained from the final exam [13].

Various approaches and learning methods used by the teacher in the classroom must be able to provide positive perceptions for students, with students having positive perceptions that will lead students to critical thinking [14]. In order to bring positive perceptions in students, the need to create a conducive, enjoyable learning environment comfortable, safe so student can build critical thinking. Each student will feel motivated if he / she learns in a pleasant environment, especially the carrying of the teacher in delivering the subject matter [15]. In a study conducted by Widyowati, it has been shown that critical thinking skills have a significant correlation with student responses. If students can provide a good response to the learning process, they can also achieve good results in learning [16].

III. HIGH-LEVEL THINKING SKILLS (HOTS)

Over the past few years, the development of high-level thinking skills (HOTS) has become a major goal in education [17]. As Resnick stated in 2010,

"improving the 'thinking curriculum' in a way that will encourage proficiency for all students is currently a major educational challenge", [18] and the views of some teachers agree that it is very important to teach HOTS students, especially to guide their generation of ideas [19]. HOTS is the result of logical thinking, critical thinking, and reasoning skills which are fundamental thoughts for everyday life [20].

The application of high-level thinking skills in lessons and assessments for example through problem-based learning or inquiry that can develop students' high-level thinking. Thinking is a skill that must be possessed by students. Through this thinking skill, students will be trained in solving problems they face, whether they are problems in solving problems or problems in their lives. Thinking can be divided into 3 categories, namely low-level, middle-level, and high-level thinking, all of which are part of the cognitive domain. It is reinforced by Anderson & Krathwohl classifying the dimensions of the process of thinking into three cognitive levels namely; (1) Low Order Thinking Skills (LOTS) which consist of knowing (C1) the level of low-level thinking ability is still limited to knowing not yet arrived at understanding. (2) Middle Order Thinking Skills (MOTS) which consist of understanding (C2), applying (C3). In the mid-level thinking skills, it has covered two levels of the level of thinking that must have not only know but also can understand. (3) Higher Order Thinking Skill (HOTS) which consists of analyzing (C4), evaluating (C5), and creating (C6) [21].

Higher order thinking skills encourage students to start analyzing problems and be able to respond to these problems. Higher order thinking skills are the highest level in cognitive processes / hierarchy [22]. One of the successes of the quality of human resources in education is that students have good thinking skills (HOTS). Lately, high-level thinking skills (HOTS) have begun to be taught to students. It can be seen from the questions of the National Examination this year which are included in the HOTS category. Growing high-level thinking among students of all ages is considered important in educational goals. The task of a teacher is how to foster high-level thinking not only for high-achieving students but also low-achieving students [23].

Usually, teachers often ignore students whose thinking skills are low. Thus, they get less attention from the teacher than high-achieving students. The importance of high-level thinking skills is taught to students because it is to increase students' thinking

power so that they do not only think in a low level. Such thing was also revealed by [24] that the core problem in the 21st century was high-level thinking skills. In this century, individuals will be confronted with more complex problems so that high-level thinking is needed to solve this problem. Therefore, for high-level skills to be achieved, students are always involved in the learning process. The student-centered learning process (SCL) has become an effective approach to improve learning experiences for students.

Student-centered learning can also be used as the main capital for students to have high-level thinking skills. In addition, the learning process must present a problem that later students can solve the problem not only remembering and repeating so that students are accustomed to high-level thinking. It is consistent with the idea that HOTS is the ability to think more than just remembering or memorizing information [25]. In these higher order thinking skills, it is not only as simple as being able to solve problems but rather to analyze the answers. It will require critical thinking and high-level thinking. Thus, high-level thinking skills are needed especially in learning in the 21st century today. Higher order thinking skills can also be referred to as metacognitive abilities, namely someone will be able to, control when the plan will be applied in monitoring and evaluating a problem. Therefore, someone who has high-level thinking skills does not only can analyze, evaluate, and create. However, it can control the plan that has been chosen, so that this skill will bring it more easily in a variety of more complex problems [26].

Now, HOTS skills have not been maximally taught to students. It is proven at the time of the National Examination where students will find it difficult to work on questions that require a high level of thinking. For example, when the National Examination was conducted a few months ago, where students complained that the questions given were too difficult and thought it had never been taught by the teacher. It should not happen if students are accustomed to practice questions that require a high level of thinking. Usually the practice questions given by the teacher only at the level of low or ordinary thinking level referred to in the taxonomy theory that starts from knowledge (C1), understanding (C2), application (C3). Based on BAN Assessment Standards 2012 Cognitive domain usage percentage of Bloom's taxonomy in the questions used by teachers is 30% memorization (C1), 60% understanding (C2), and 10% application (C3), while the questions that demand analysis (C4), evaluation (C5), and creating (C6) is not given by the teacher. Ideally the formative tests

performed by the teacher 80% must include high-level thinking skills (C4-C6) [27].

Often teachers provide practice questions at a low level because generally teachers are still constrained in making questions in the HOTS category or high-level thinking. Thus, the current learning process is still very far to reach students who have high-level thinking skills. In connection with this matter, [28] stated that the current learning process still (1) did not present the importance of high-level thinking in the learning process such as in discussions, exercises, and assignments consisting of the ability to analyze, evaluate, and create, (2) the process of learning activities is still lacking, such as gathering, processing, presenting, and concluding, (3) less emphasizing the importance of contextual learning such as presenting surrounding problems for students to analyze so that it will form a higher level of students' thinking.

Therefore, the learning process does not only arrive at the realm of knowledge but until it becomes a skill or finds ideas to be used in solving real problems. The above conditions are a necessity for students so that it is a challenge for teachers to create quality learning besides the needs of students in the process of HOTS thinking skills are very important [29]. There are several benefits that arise if a person has a high-level thinking ability which can think critically so that they can solve problems, dare to make decisions, be able to think reflectively [30]. In addition, by having high-level thinking skills, it can improve learning achievement, be responsible, and have creative ideas in solving a problem, and be able to make decisions and plans [31]. From these various benefits, high-level thinking will always connect critical ways so that the two development ideas always have a connection. Because HOTS's ability is not only at the level of remembering, memorizing, understanding but more in need of other higher abilities such as the ability to think creatively and critically [32]. Like King's opinion, high order thinking skills include the ability to think critically, logically, reflectively, metacognitively, and creatively, while according to Newman and Wehlage [33] with higher order thinking skills, students will be able to distinguish ideas or opinions clear, dare to argue well, have the ability to solve problems, many have creative ideas, always try to find solutions to a problem, able to construct an explanation, able to hypothesize and understand complex things become clearer. It is also stated that with HOTS students become independent thinkers, the arguments put forward by students can be an indication of the quality

of students' abilities. The following is an example of the HOTS learning paradigm.

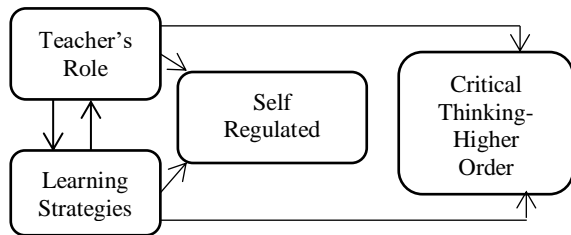


Fig. 1. HOTS learning paradigm

IV. DISCUSSION

The importance of awareness of high-level thinking skills is not only for students but also for teachers. First, the teacher must realize that high-level thinking skills are very important for students. In addition to developing the level of thinking, students can also achieve better educational goals. Both high-level thinking skills can be designed or included in the learning curriculum. It is important because it can apply what kind of learning model that can encourage critical thinking and high-level thinking skills. The three students must be used to working on problem exercises in the HOTS category. It is where the role of the teacher is also involved in students' high-level thinking skills.

How a teacher can provide practice questions that are not only at a low level of thinking but also at a high level of thinking (HOTS). Frequent student thinking activities that only involve a low level of thinking are not at a high level of thinking. As a result, students find it difficult to find questions in the HOTS category or Olympic type questions. The importance of improving high - level thinking skills can also make students have critical thinking. Both processes of thought influence each other.

A. Junior High School Student Thinking Level

The level of thinking of Indonesian students in 2012 ranked 63 out of 64 countries with an average score of 375 and an average OECD score of 494 [2]. According to Piaget's theory of thinking, the stage of thought thinks there are four stages: the motor sensory stage in 0-1.5 years, the pre-operational stage 1.5-6 years, the concrete operational phase 6-12 years, the formal operational phase 12 years and above [34]. Based on the distribution of periods of children's intellectual development by Piaget, junior high school students were in the period of concrete operations and began entering a period of formal operations. In the concrete operating period, here is the beginning of logical rational thinking that can be applied to concrete

problems. It means showing that students can learn using problem-based approaches. Because with this problem-based approach, it is very suitable to improve students' high-level thinking skills. Especially during this junior high school, the beginning of the rational thinking of students began. However, if you look at the facts in a very different field where the way of thinking students tends to be oriented to memorizing to master knowledge [35]. This way of thinking processes will make students unable to implement science into their life or environment. The process of thinking that only refers to memorization cannot make students have critical thinking let alone arrive at high-level thinking.

B. Curriculum Based on Critical Thinking and Higher Thinking Skills (HOTS)

The practice of teaching and learning conducted by the teacher has never been separated from the knowledge of curriculum aspects. For this reason, the importance of curriculum design and development is based on critical thinking and high-level thinking skills of students. In various countries, students' critical thinking skills have been successfully applied in the world of education. Based on the results of the study [36] entitled critical thinking, the use of research and barriers to this among nursing students in Scandinavia and Indonesia published in the Nordic Journal of Nursing Research states that the results of critical thinking skills of Scandinavian and Indonesia students, where critical thinking in Scandinavia is higher compared to Indonesia. One reason for the differences in critical thinking of Scandinavian and Indonesian students lies in the level of competence of Scandinavian and Indonesian teachers. In Scandinavian country, there are more teachers who have master's degrees and Ph.Ds, while in Indonesia, it is still very different compared to Scandinavian country.

In addition, in several countries, they have begun to design teaching curricula on critical thinking and high-level thinking skills (HOTS). In the research results [37] for example in Malaysia in an effort to improve HOT teaching more effectively, the Ministry of Education (MOE) implemented a series of structural reforms through an integrated curriculum for Secondary Schools (KBSM) introducing critical thinking skills, in 1988, Vision 2020 in 1991, Critical and Creative Thinking Skills (KBKK) in 1996, and the concept of "smart school" in 1997, with the aim of producing human capital with high thinking skills. Then, in 2012, the MOE of Malaysia released the initial report of the 2013-2025 Malaysia education blueprint which emphasized HOTS into three

important aspects of education: a written curriculum, a taught curriculum, and a review curriculum.

HOTS has provided excellence from several aspects so the teacher must hone the effectiveness of HOTS in class teaching activities. Besides, other country that apply critical thinking and high-level thinking skills is Scandinavia, where in Scandinavia the ties of critical thinking are superior to Indonesia, which is reported by Pitt et al. Almost all countries consider that improving high-level thinking skills that are important not including in Indonesia itself also begins to improve higher-order thinking skills. Included in the 2013 curriculum which contains models, strategies, and approaches where in fact if it can be implemented properly, it can contribute to higher order thinking skills. Absolutely, it is also balanced by approaches in learning such as approaches using topics or problems that can prioritize activities of analyzing, evaluating, and creating. Thus, it is known what is important and what is expected from our education system.

C. Teachers as the Movers of Higher-Level Thinking Skills

In some countries, it is always thought that critical thinking is a very important thing in education. Furthermore, in the study conducted by [38] in Taiwan, it was also mentioned that in recent times, the development of critical skills was emphasized especially in school physical education [39]. The development of critical thinking skills can also encourage students' motor skills when solving a problem. In this study, it also mentions that critical thinking in physical education, which is primarily characterized by students who are challenging to produce unique solutions to the movement problems [40] before that becomes an important strategy to improve personal critical thinking. Different if in social study education, it is perhaps the development of critical thinking will be able to produce creative solutions or ideas from the surrounding social issues that are being discussed in the classroom.

Besides, the ability to think critically also always involves high level thinking skills. That is why the 2013 curriculum emphasizes that high-level thinking skills are important skills that must be possessed by students. It is supported by [31] research results showing that high-level thinking skills are important learning outcomes in education. It was also conveyed by [41] who stated that critical thinking skills are also one of high-level thinking skills, both of which are interrelated because in high-level thinking can also

shape students to be critical and creative. Critical thinking teaches students to be able to dare to make decisions that they think are true and trustworthy and accountable. Critical thinking skills of students need to be constantly improved because they influence the ability of students to solve problems in everyday life. Besides, it can also improve the quality of graduate students to be able to compete in filling the labor market.

V. CONCLUSION

Various discussions above can be concluded that higher order thinking skills are very important in education to develop the mindset of students. As it has happened in several countries that have started implementing higher order thinking skills in education. This condition is different from our current students whose level of thinking is still low. It is proven by several research results. It is because all this time the curriculum implementation has not been implemented entirely in learning activities, such as the implementation of models, strategies, or an approach oriented to higher order thinking skills, namely prioritizing activities of analyzing, evaluating, and creating.

VI. RECOMMENDATION

Based on the results of the discussions that have been conducted, it is recommended for all educators to be able to apply learning activities that stimulate higher order thinking skills given the importance of these skills in the 21st century. It can be done by giving students the problems of either description or multiple choices to be resolved through the process of analyzing, evaluating, and creating.

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