

# Integrating Higher Order Thinking Skills (HOTS) of Young Adolescent Students through Scientific Approach in English Language Learning

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**Abstract:** Although Scientific Approach (SA) as a part of Curriculum 2013 has been implemented, Higher Order Thinking Skills (HOTS) seemed not to be integrated in English language learning. This study presents the results of qualitative study aiming at investigating how teachers integrated HOTS in English learning through scientific approach, what benefits gained by the students in their learning; what teachers' constraints are faced and how to overcome them. Two classes of seventh graders from two different schools were involved as the subjects of this study. Classroom observation, interview with the teachers and the students, and documents analysis were occupied as the instruments in collecting the data. The findings from classroom observation revealed that all principles of scientific approach, called 5M (observing, questioning, associating, exploring, and communicating) were implemented to promote the students' HOTS in those two classes. The teacher also admitted in the interview that through this method students seemed to be motivated and enjoyable since they got opportunity to know some language exposures and experience in using the language. In this situation, they felt free to express their ideas, arguments, and responses to the questions based on their prior knowledge and experience. Their promoted skills can be seen from their written works of the students while the integration with HOTS done by the teachers was proved from the lesson plan they made.

## 1 INTRODUCTION

Recently, the government of the Republic of Indonesia just released the 2013 Curriculum as the replacement of the 2004 Curriculum. This is due to some reasons explained by Kemendikbud (2013), such as: (1) the previous curriculum (the Curriculum 2004) has not been sensitive and responsive to social change at local, national, and global level; (2) the content of the curriculum is still too dense as indicated by the number of the materials and subjects as well as the difficulties beyond the level of children development; (3) the competencies do not describe holistically the domains of attitudes, skills, and knowledge; (4) some of the competencies required in accordance with the development need has not been accommodated in the curriculum. It means that the curriculum can only educate students to achieve knowledge and underrate students' skills and attitude.

Regarding this, the essential of the Curriculum 2013 is presented through scientific approach which

covers 5M principles, namely: observing, questioning, associating, exploring, and communicating. As explained by Kemdikbud (2013) cited in Zaim (2017), observing is defined as the activity to introduce the learning materials to be learned. At this stage, the teacher provides students wide opportunity to recognize and be acquainted with the things to be learned. In ELT context, this stage can be done through the activities of seeing objects, reading, or listening. Questioning functions to encourage and inspire learners to actively learn and develop questions of and for itself (Kemdikbud, 2013). According to Zaim (2017), it can be done by asking questions to students so that they can argue and develop their thinking ability as well as enriching their vocabularies and social tolerance in gregarious. Experimenting can be conducted by dividing students into some groups, asking them to discuss and supervising the learning process to ensure that all students are actively involved in the discussing (Zaim, 2017; Kemdikbud, 2013). Associating is defined as the ability to analyze and associate the

information occurred within the group. Zaim (2017) mentioned that it aims to find the relationship between one information to other information and to find the patterns of interrelationship of information so that students can make conclusion from the pattern found. Lastly, communicating is the ability to conclude the facts that have been observed and experimented (Kemdikbud, 2013). Zaim (2017) stated that there are four activities that can be done in the classroom, namely (1) asking the students to read their work to the class; (2) asking each group to listen well and provide additional input with regard to the work of each group; (3) giving explanation after the group discussion ended; (5) structuring tasks and providing opportunities to the students to demonstrate attitude, skills, and understanding of the substance of learning given.

As a pedagogical implication from this approach, Indonesian teachers are required not only to transfer knowledge like what they put in the package of learning materials, but they also should consider the moral values that should be given in character education. Therefore, education can result in preparing students to have good characters. By doing so, they are able to compete globally in accordingly with the principles of Pancasila. In addition, the Law Number 20/2003 on the National Education System expects that teachers and education practitioners are able to realize the process of developing students' personal qualities as future generation. It means that students are necessary to possess good moral value and critical thinking skill which aims to prepare them in facing life phenomena and enable them to solve their own problems.

In order to achieve this goal, curriculum as one of educational resources can be employed to make a significant contribution in realizing the development of students' quality. According to Sofyan (2016), curriculum is a fundamental part of educational program which refers to the means and materials which students will interact for the purpose of achieving identified educational outcomes. This is also supported by the Law No.20/2003 on National Education System which defined curriculum as a set of plans and arrangements regarding the purpose, content, teaching materials, and methods used as guidelines for implementation learning activities to achieve specific educational goals.

Furthermore, the regulation issued by the Minister of Education and Culture (Permendikbud) No. 81a/2013 declares the process of learning in the Curriculum 2013 should provide opportunities for students to be able to develop any learning pattern that occurs inside the two ways interaction between

teachers and students. It means that teachers do not have to always more dominant in delivering the learning materials, but they should actively participate during the learning process. Shofwan (2016) further mentioned that in the Curriculum 2013, learning activities apply scientific approach as a main approach. It applies scientist's steps in building knowledge through scientific method. The learning model needed is the model which allows students to think scientifically and critically as well as develops the sense of inquiry (Shofwan, 2016). In addition, Shofwan (2016) stated that scientific approach has three main characteristics, including: centered on students, involves the science process skills in constructing the concept, law and principle, involves the cognitive processes of potential in stimulating the development of intellect, especially higher order thinking skills (HOTs) of students, and be able to develop the character of students.

In order to make students think critically, Setyarini (2016) believed that English language teaching can be done in accordingly with some strategies of Higher Order Thinking-based learning, such as open-ended questions, abstract to concrete, roleplay, and gesturing. From her research (2016), it revealed that students' cognitive level, especially in terms of "analyzing and evaluating" can improve students' speaking skills through these strategies as seen from their opinions, arguments, and judgements. Moreover, Moon and Nikolo (2000) asserted that Higher Order Thinking skills (HOTs) helps students in practicing literacy. They could master vocabularies, understand grammar, and get the meaning of discourse in a holistic manner.

Although the term of scientific approach is familiar for science teacher, it seems very new and weird for English teachers. This is due to some methods that commonly used by the teachers which are not related with the scientific terms and procedures, such as grammar translation, audio lingual, communicative language teaching, and natural approach (Richard and Rodger, 2001 in Shofwan, 2016). As an impact, the study conducted by Shofwan (2016) revealed that some teachers were still confused and unsure in implementing scientific approach for teaching English to their students and their learning objectives could not achieved optimally. Therefore, this paper aims to investigate how Higher Order Thinking skills is implemented through scientific approach in teaching English for young adolescent students and obtain the data regarding the benefits gained by students as well as the difficulties faced by the teacher and the strategies to overcome those challenges.

## 2 RESEARCH METHODS

As a research design of this study, ethnography study was employed. According to Asher (2012), ethnography is a collection of qualitative method that focuses on the close observation of social practices and interactions. It concerns on the study of social interaction interactions, behaviors, and perceptions that occur within groups, teams, organizations, and communities (Reeves, 2008). In educational context, Wilson (1997) cited in Angrosino (2007) mentioned that human behavior including the teacher's and the students' role are significantly influenced by the setting in which it occurs. It is believed that the study phenomenon in classroom in natural setting is essential since it reveals regularities in behavior that often transcend differences among individuals. This becomes the main reason that ethnography study is valuable to assist the researcher in obtaining rich and holistic insights into teachers' and students' views, actions, and behaviors during the implementation of the learning model (Reeves, 2008).

In addition, one class from one selected school in Bandung was selected as the research participant of this study. During the process of collecting data, three research instruments were occupied by the researcher, such as classroom observation, interview with the students and teachers, and documents analysis. Regarding to the types of the classroom observation, two types of observation that can be gained in ethnography study, namely participant observation and field notes. Participant observation requires the researcher to take a part in the daily activities of the individual being observed, while the field notes are taken on the spot or as soon as possible. This study was also used a semi-structured interview to make the students and the teachers comfortable in answering questions without any worry or making them hiding something. The interviews were done in two languages (Bahasa Indonesia and English) and they were free to choose one of them if they wanted to. Regarding documents analysis, Payne and Payne (2004) in Reeves (2008) described that the documents analysis is the technique used to categorize, investigate, interpret and identify the limitation of physical sources, most commonly written documents whether in the private or public domain. Related to this study, some documents that analyzed to obtained the data were lesson plans which created and used by the teacher, students' writings, the written stories provided by the teacher, and some videos that shown to the teacher. All of those documents helped the researcher by providing some information related to the implementation of this learning model.

After the data from three instruments have been obtained, the data analysis was conducted to answer the research questions of this study. Qualitative descriptive analysis was employed as the main approach of this study since it focused on how Higher Order Thinking skills (HOTS) is integrated in English language learning through scientific approach which required detail description and interpretation about teachers and students experience in this implementation.

The process of analyzing the data was conducted both under the process of the implementation and after the implementation of the learning model. This is due to the statement of Kumar et al (1999) cited in Reeves (2008) who claimed that in ethnography study, ongoing data analysis was essential to ensure that the data are clean and free from incompleteness and discover additional themes that may be needed. Regarding to this, the data gained from classroom observations were analyzed during the process of the study while the data which were analyzed after completing the study were mainly gained from documents analysis and interviews with the students and the teachers.

## 3 FINDINGS AND DISCUSSION

The implementation of Higher Order Thinking skills in teaching English for young adolescent students is related to the stages of scientific approach in the Curriculum 2013. From three research instruments, the study revealed some results as explained in the following.

### 3.1 Research Findings

Generally, the findings of this study showed that the teacher from the selected school integrated HOTS through scientific approach in teaching English by using some strategies, such as brainstorming, giving open-ended questions, providing abstract to concrete concepts, mind-mapping, and role playing. Each of these strategies are basically related to the stages in implementing scientific approach as explained by Kemdikbud (2013), namely observing, questioning, experimenting, associating, and communicating.

In the learning process, it lasted for 90 minutes to implement HOTS through scientific approach. The teacher used story as a learning media to be implemented in the classroom. As a topic, the teacher chose a story entitled "Things in My Bag" to be presented to the students. The English teacher divided the learning process into three sections, namely

Opening (Pre-Activity), Main Activity, and Closing (Post-activity). As the title of the story chosen at that time was “Can You Guess What is Inside My Bag?” presented through the pictures, white board, and power point slides.

In the opening section (Pre-Activity), the teacher started the lesson by giving open-ended questions, such as what if, what about, why, how, etc. Such questions were closely related to the story being discussed which encouraged them to think from different sides about the content of the story, either connecting it to their prior knowledge or experience. Regarding the result of the classroom observation, open-ended questions provided by the teacher seemed successfully invite students to actively participate in the classroom. The students were brave and confident enough to explain their opinion and argument in accordingly with the questions.

Besides that, during running this session, the teacher never put negative comments to the students by saying “your word is not appropriate, your sentence is grammatically wrong, you made a mistake on your answer”, but the teacher expressed their enthusiasm and positive responses to their students by saying: “Yes, that’s good. That is a good try”. What the teacher did in this session referred to be a motivator who asked and motivated his students to be active in classroom participation. However, the teacher used another strategy to encourage the students’ motivation to learn English and tried to maximize the materials through giving mixed-questions not only open-ended questions but also the closed questions. Some findings caught from the classroom observations described that the teachers used pictures as media to conduct Brainstorming which was done before storytelling started. The pictures were in the form of objects found in the classroom and their vocabularies in English. Then, the teacher taught the students how every word was pronounced in English and the students were then asked to repeat the pronunciation. It was implemented by the teacher to give a guidance or support to the students to start concentrating their mind to the story. Some pictures provided also could trigger the students to connect their experience to the story they were talking or recalled their previous knowledge to the present story.

Some strategies were noted from the teaching activity in which the teacher did mind-mapping by using the information collected from the students during the brainstorming. The activity is called mind-mapping which was done through drawing a mind-mapping tree with many branches filled by sub-topics whereas the trunks were used to write some related

vocabularies. After drawing, the teacher gave an opportunity to the students to make one sentence using sub-topic and vocabulary available in the tree. Along this activity, most students showed their enthusiasm to connect the sub-topic to vocabulary to make a simple story. In addition, they felt enjoyable to think logically through combining the topic and the word or sentence. Even the students kept trying to express what they had known about the story and what they did not know.

Based on the classroom observation results, the data showed that the teachers integrated Higher Order Thinking Skills (HOTS) in the main activity through implementing several strategies such as repeating words and gestures, making abstract to concrete objects, and using realia. Repeating words and giving gestures were found several times during the observations. These were done by the teacher through writing and pronouncing key vocabularies used in the story. Meanwhile, giving gestures were done by the teacher through imitating the actions of the characters like what they did in the story. It was done to help the students’ understanding the key words which would support their comprehension to the whole story.

In this section, the following activity was done by making abstract to concrete. As an example to explain the concept of “heavy”, the teacher directly gave a practical action that caused them imagined how the word of “heavy” is looked alike so that it eased the students catch the meaning of that word. The researcher observed this strategy was continuously employed by teacher during the storytelling activity.

Concerning to the main conflict on the story, the teacher invited the students to be a problem solver in the conflict as they were asked to give ideas, suggestion or reasons why they took those solution responding to problems given by the teacher. To prepare their ideas, reasons, and suggestions, the teacher gave 10 minutes for the discussion. During the discussion, the teacher supervised the students and gave some inputs to complete their opinions, proposed to give problem solution.

In the Closing section, the researcher also caught that the teacher assigned the students to create their own story. The story-creating process was done through several stages such as creating the main framework of the story, discussing the character and the plot, developing the characteristics of the actors, and creating the whole story. This activity lasted for 30 minutes while being supervised by the teacher. When some stories have been created by each group, the representatives of each group were asked to tell it in front of the classroom. The story was delivered in English and the students were allowed to read the

story in order to avoid the missing information from the story. After each representative of the group finished to deliver the contents of their story, the teacher assigned the other group members to respond to the story. From these responses, the researcher took a note in the observation sheet to determine the level of students' thinking skills.

Regarding the teacher's experience in integrating Higher Order Thinking skills in storytelling, the teacher claimed that she was familiar with Higher Order Thinking skills closely related to critical thinking. She was aware that critical thinking skill implemented in the classroom could encourage the students' enthusiasm in the learning process. From the interview with the teacher, it revealed that critical thinking was stimulated by giving some critical questions to the student such as "why" and "how if" that placed the students as a character in the story facing a particular situation. By doing so, the students were encouraged to actively participate in the classroom activities and they enjoyed giving their response and opinion without being worried of making mistakes. According to the teacher in the interview, she was frequently surprised with the students' responses that were unpredictable and unusual even they could think something out of the box. Such a situation couldn't be found in the regular teaching session which commonly only focused on comprehending the materials. Furthermore, the teacher believed that the teaching process should be conducted by addressing the students' need and characteristic in order for an effective and active learning environment to be gained. This belief was reflected in the teacher's performance that used various teaching media such as pictures, video, and realia to help the students understand the story delivered.

Nonetheless, some difficulties were faced by the teacher in integrating HOTS with storytelling especially to develop an active learning environment in the classroom. As stated previously that critical questions were one of the stimuli to invite the students' response, but it was not that easy for the teacher to construct an efficient critical question that could be easily understood by the students and facilitate them to extend their ideas.

Moreover, the teacher also dealt with some grammatical errors in providing the questions since the questions should be immediately adjusted with the students' response. To avoid misunderstanding, in some cases the teacher preferred to repeat the questions in Bahasa Indonesia for the purpose of clarity. Another difficulty was dealing with providing teaching materials that could facilitate HOTS in storytelling.

According to the teacher, most of the materials provided in the text book were irrelevant either in the language level or in the content level for the students. For example, an inappropriate story chosen could cause the students to be less motivated in the learning process since the story was not contextual and familiar in their life so that there was no emotional engagement with the students.

In the relation to some difficulties faced during the learning process, the teacher applied some strategies to solve those problems. First, it was important to determine the learning objective and goal before conducting the learning process. By doing so, the teacher said that she would be easier to create valuable critical questions that could extend the students' ideas and opinions. Besides that, the teacher was supposed to modify or create original teaching materials that were able to accommodate the students' characteristics. The teacher usually simplified the language use in the story such as changing with synonyms that were more familiar for the students. Meanwhile, for the content of the story, the teacher modified it by replacing the character and setting with something commonly found in society around the students.

Data gained from document analysis was expected to support the data from the classroom observations and interviews with the teachers and the students. Specifically, in that school, there were three types of documents that were analyzed, namely lesson plan created by the teacher, teaching media and learning sources, as well as the written stories composed by the students.

In terms of the lesson plan made by the teacher, some points were analyzed to obtain the data, such as learning objectives, appropriateness of learning materials, sequences of learning activities, and assessment procedures. From the learning objectives contained in the lesson plan, the teacher formulated four learning objectives which covered the aspect of cognitive, psychomotor, and affective.

### 3.2 Discussion

During the implementation of Higher Order Thinking skills in English language learning, some major concepts suggested by King and Rohani (2012) should be understood by the teachers. First, the levels of thinking cannot be unmeshed from the levels of learning since they involve interdependence, multiple components and levels. Second, whether or not thinking can be learned without subject matter content is only a theoretical point. In real life, the students will learn content in both community and

school experiences, no matter what theorists conclude, and the concepts and vocabulary they learn in the prior year will help them learn both higher order thinking skills and new content in the coming year. Third, higher order thinking involves a variety of thinking processes applied to complex situations and having multiple variables. (King and Rohani, 2012, p. 12).

From the results of this study, it could be seen that scientific approach is done into several essential elements namely, observing, questioning, associating, experimenting, networking, and communicating. Those stages are implemented through sequential ways starting from observing stage as the simple one until communicating stage as the post activity in this approach. Generally, concerning on the implementation of learning process from classroom observation, the learning process is divided into three main phases namely; opening activity, whilst-activity, and post activity. Each of the phases is done through several strategies such as brainstorming, mind mapping, storytelling, role playing, and playing game.

In the opening activity, the teachers implemented some strategies including brainstorming and mind-mapping. The brainstorming is done through showing some related pictures to main topic and asking the students about what they experience related to that topic. This is similar to what scientific approach suggested that initial learning should be stated from observing an object. Observing stage was aimed to introduce a new knowledge that is going to be delivered in the learning process. In this phase, the students were stimulated to recall some of their prior knowledge. To get in depth knowledge on the object, asking some questions is essential to generate some ideas about the object including its structures and elements. This activity was implemented through implementing both using closed question and open-ended question in sequential stage. The teacher started to give close-questions such as “what” and “where” aiming to ease students answered the questions and get familiar with the topic discussed. Closed-questions was then followed by open-ended questions such as how and why in order to stimulate students deeply thinking about the materials. Such questions required the students to analyze some relations among the object being discussed with others and provide logical reasoning for supporting their claims. As the students’ understanding about the material improved, it seemed that students paid attention to the lesson better. Some students raised their hands to ask several questions which aimed to clarify, confirm, or even evaluate their understanding

on the object being discussed. In this case, the students’ question is regarded as an indicator that the stage of scientific approach has achieved the second phase, questioning phase. Meanwhile, in the main activity, several strategies used such as storytelling and roleplaying were employed as strategies to deliver various learning materials in different schools. Storytelling as one of attractive learning model was done through several techniques including using gestures and mimic, repetition of some essential words, making abstract to concrete, and scaffolding. In the storytelling process, the teachers several times stop telling the story and letting their students to guess what would happen next in the story. students’ response this by producing different predictions, as a result of their understanding toward some parts of the story and draw a connection from one event to another event in the story. In addition, strategy of making abstract to concrete was also implemented to help students understand intended meaning of the story. Some concepts in the story is quite new and unfamiliar to the students at which the teacher should elaborate it more through giving several supporting ideas about it in more simple way, so that the abstract concepts to be real and tangible in the students’ life. For example, explaining the concept of being greedy, rather than giving the direct translation of the words, providing some practical examples of that attitude in the real life related to the word were more essential to understand it to be a concrete thing. By doing so, the students were trained to think abstract things obtained through reflecting the practical examples toward their experience on it. In this process, the associating thinking of scientific approach was clearly identified on how the students connect, compare, and contrast what they have in their experiences to the abstract concept being discussed.

Concerning on the post activity, generally in this session the students were given task to create, and modify the modeled story to be their own version. The activities were initially done by guiding the students to evaluate and criticize the characters of the story based on several characteristics laying on them. The students tried to create some statements related to their opinion on the characters which were stimulated by giving them open-ended questions such as how if and what if. The students judged the characters based on some moral values laying on their social life whether it was good or bad. From the observation, it is clear showed that the students’ thought related to the teacher questions were various since the students shared different experience and knowledge with others about the topic. The students’ ability to give comments and judgment were

identified as the higher level of thinking before creating. It still belongs to the association process where the students learn to compare and contrast the values in the story with the expression in thesis life. These various answers were also due to the context of the question given by the teacher that has been familiar with the students. As explained by King and Rohani (2012), context becomes one of the major concepts that should be understood by the teacher in integrating Higher Order Thinking skills. Context affects the level of someone's thinking since the real-world situation provides many challenges for someone to think critically. Furthermore, the activity was ended by asking students in groups to present what they already worked on the process of making story in front of the class. This process is known as communicating stage in the scientific approach where the learning outputs were done in the form of the students' story version. Through story, the students learned to perform problem thinking through communicating stage, some of students' output may reveal in the form of story map or paragraph.

Based on the findings obtained from three instruments, positive impacts of HOTS in storytelling are significantly identified from the students' acknowledgments in the interview, students' work, and classroom observation. Generally, HOTS in storytelling has positively affected on both students' cognitive skill and affective skill.

Concerning to the impact on cognitive skills, the students noted that implementing HOTS helped them to comprehend leaning content given by the teacher including improve their comprehension about the story as well as linguistic aspects. By implementing some strategies such as brainstorming, mind-mapping, critical questions, making abstract to concrete, and multiple intelligences take the teacher deeper exploring about events, characters, and conflicts appeared in the story as it is stated by one of the students in the interview.

Referring to the analysis results from the interview with the teachers from three different Junior High Schools, they clearly admitted to face some challenges in the implementation of Higher Order Thinking in storytelling to teach English to their students, either internal or external challenges. In term of internal challenges, the teachers met some problems related to the lack of teachers' knowledge and beliefs about the importance of teaching thinking skills that should be integrated in English learning process. Meanwhile, the external challenges cover the school system that did not facilitate the teachers to integrate thinking skill into instructional process.

On the other hand, the challenges faced by the teacher during the implementation of Higher Order Thinking in storytelling were coming from external factors such as the school system and the curriculum set by the Ministry of Education and Culture, Republic of Indonesia (Kementerian Pendidikan dan Kebudayaan Republik Indonesia). The challenges emerged from the schools system was the time allotment, learning environment, and teaching resources provided for the teachers to teach Higher Order Thinking skills.

In order to overcome these challenges, the teachers from the selected school used some strategies, namely joining the professional development programs and working with small groups of teachers who have sufficient knowledge of Higher Order Thinking skills.

The teachers from each school employed different strategies to implement the learning model. Generally, those strategies were aimed to make the students actively involved in the learning process. As the example, brainstorming gave positive impacts on the learning process. The significant result is the students' higher order thinking skills were generated by this strategy.

## 4 CONCLUSIONS

From the findings of the study explained above, some points can be concluded. First, the teacher implemented Higher Order Thinking skills through scientific approach in teaching English for young adolescent students by using several strategies such as brainstorming, mind-mapping, giving open-ended questions, doing repetition, gesturing, and explaining abstract to concrete. During the implementation of these strategies, the teacher divided the lesson into three sections, namely Opening, Main Activity, and Closing. In the opening section, the teacher employed brainstorming and mind-mapping to generate students' ideas, familiarize the students' with the topic of the lesson, and understand the basic concepts of the lesson. The brainstorming activity was done through showing some related pictures to the main topic and asking the students about what they have experienced regarding the topic. This is similar to what scientific approach suggested that initial learning should be stated from observing stage. It aims to introduce a new knowledge which is going to be delivered in the learning process. In addition, to get in depth knowledge, two kinds of questions were also employed by the teacher, namely open-ended question and closed question. The teacher firstly

started to give closed-questions such as “what” and “where” aiming to ease the students answered the questions and get familiar with the topic discussed. Closed-questioned was then followed by open-ended questions such as how and why in order to stimulate students deeply thinking about the materials. Such questions required the students to analyze some relations among the object being discussed with others and provide logical reasoning for supporting their claims.

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