PROMOTING HIGHER-ORDER THINKING SKILLS (HOTS) FOR YOUNG LEARNERS IN A BILINGUAL CLASSROOM

Anang Widodo[*, a,1]

[a] University of Technology Yogyakarta, Sleman, Indonesia
[1] anang.widodo@staff.uty.ac.id*

Abstract

Adopting Bloom's Taxonomy of higher-order thinking skills (HOTS) in a bilingual classroom, especially for young learners, needs creativity and extra effort from teachers since it deals with involving students with complex activities and difficult tasks. This present study reveals how to implement HOTS in a bilingual classroom and the challenges during the learning-teaching activities. This study involved 21 second-grade students of Al – Azhar 55 Islamic Primary School in Yogyakarta, two homeroom teachers, and a native speaker. The data were collected from the interview, document analysis, and classroom observation. The result of the study shows that to promote HOTS during the learning-teaching activities, the teacher implements hands-on learning teaching strategies and involves ICT to help students understand the topic discussed easily in a fun way. Meanwhile, the challenges occurring lie in students' motivation to learn and lack of skill in writing. This study yields interesting results which can give another option to implement HOTS for young learners in the context of the bilingual classroom.

Keywords: Bilingual Classroom, Bloom Taxonomy, HOTS, ICT.

I. INTRODUCTION

Higher order – thinking is conceived as students being able to relate their learning to other elements beyond those they were taught [1]. The higher–order thinking skill (HOTS) is a collaborative process between all subjects' teachers and can be taught for all levels of students even from early learners. One of the skills which refer to higher–order thinking skills is critical thinking. Promoting critical thinking to children needs contributions from adult people such as their parents or teachers. Florea and Hurjui [2] state that critical thinking is a product, i.e. a level reached by the thinking that a natural way to interact with ideas and information. The child is trying to find meaning in the events and the world around him, and the adult has the task of creating opportunities for research and exploration, providing emotional support, security, and encouraging knowledge.

The role of teachers in calculating HOTS is an important aspect of teaching HOTS effectively [3]. Abosalem [4] mention that improving students' higher–order thinking skills is a collective experience; one teacher of a specific subject cannot alone improve. The concept to implement HOTS should be well taught since it follows sequenced activities and involves teachers who have the same idea or concept to promote HOTS for students. Besides, another solution that can be used by teachers to promote higher–order thinking skills in students is by implementing ICT in their classroom. Collaborative learning and integrating ICT into the learning process are commonly found to promote HOTS to students in several countries. Maximizing learning of higher-order thinking skills with information and communication technology (ICT) has been deep-rooted and emphasized in multiple developed countries such as The United Kingdom, The United States of America, and Singapore. It is noted that these assessments on ICT integration to promote HOTS in education systems have been focused mainly on primary and secondary-level teaching and learning [4]. Besides, integrating Technology-Enhanced Language Learning (TELL) programs and devices into language classrooms is beneficial for language teaching. Creating a positive attitude in teachers toward the use of technology and computers in their classes could be claimed that the contribution of such a course to the system of education is remarkable [5]. The existence of technology in the learning process will facilitate students to learn and it also creates a positive atmosphere because teachers intend to look at the technology provided as an effective tool for developing constructivist practices and for gaining students' interest. Students are given free rein to be in charge of learning experiences [6].

However, promoting HOTS in bilingual classrooms provides more complex challenges for teachers since they also have to deal with the language barrier and the diversity of students' English skills. A bilingual classroom provides more challenges for teachers to facilitate learners to conduct the learning process effectively. Besides effective programs or curricula, a school should also create an English environment that supports the program. Whitacre [7] mentions that many dimensions can define the effectiveness of bilingual education such as; program goals, organization, and curriculum. It can also be measured using indicators that reflect the classroom environment and instructional process and student learning. The language used in a bilingual classroom may vary from one to several languages. Garcia [8] outlines two ideologies or philosophies for viewing bilingual education: monoglossic and heteroglossic. This marks a departure from abstract notions of bilingualism as either the sum of two languages or the interactions of two or more languages on either a personal, local, societal, or global level.

Teaching young learners in a bilingual classroom offers multiple challenges. Teachers have to make sure that the language barrier can be minimized to create effective learning and teaching processes. Students come to their classrooms with different levels of English proficiency. The role of teachers to facilitate and help students with language problems is essential. The bilingual teaching classroom is much preferred as it helps the instructors to develop learners' understanding of the learning content and translation of English is best accepted [9]. The primary EFL classroom offers various opportunities for young learners to work with the target language creatively and productively. Creating opportunities for exploratory and independent language use should also be considered in textbook and curriculum development so that it can develop children's natural potential of communicative competence [10].

This paper aims to explore the implementation of promoting higher-order thinking skills among 21 second-grade students of Al – Azhar 55 Islamic Primary School in Yogyakarta and the challenges faced by the homeroom teachers and a native speaker to promote HOTS in a bilingual classroom. This research will focus on two questions. First, how are higher-order thinking skills (HOTS) implemented for young learners in a bilingual classroom? Second, what are the challenges in implementing HOTS for young learners during the learning-teaching process?

Higher–order thinking skills are adopted from Bloom taxonomy 1956 which classifies cognitive performance into six major headings arranged from simple to complex as follows, 1) Knowledge, 2) Comprehension, 3) Application, 4) Analysis, 5) Synthesis, 6) Evaluation. However, in 2001, Anderson and Krathwohl proposed a new revision of Bloom Taxonomy as explained in table I.

TABLE I. A NEW REVISION OF BLOOM TAXONOMY'S HOTS

No.	New Revision of HOTS	Activities
1	Remember	The activities can be in the form of recognizing or recalling facts and concepts.
2	Understand	Processes in this category include; interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
3	Apply	To apply means implementing a procedure to solve a problem.
4	Analysis	To analyze is breaking information into its parts, determining how the parts are related to each other, and the overall whole. Its Process includes differentiating, organizing, and attributing.
5	Evaluate	The activities can be in the form of checking and critiquing.
6	Create	To create means putting disparate elements together to form a new whole, or reorganizing existing elements to form a new structure.

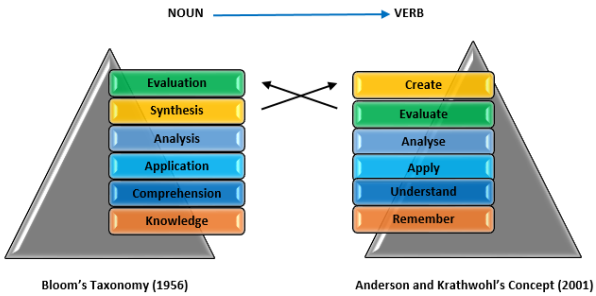

Figure 1. Anderson and Krathwohl's revision of Bloom's Taxonomy

The comparison between the 1956 Bloom Taxonomy and the 2001 revision proposed by Anderson and Krathwohl can be seen in the following figure 1. Onosko & Newmann [11] defined HOTS as the potential use of the mind to deal with new challenges because HOTS can challenge the individual to interpret, analyze, or manipulate information. For many teachers, operating with their state standards and curriculum documents, higher–order thinking is approached as the "top end" of Bloom's taxonomy: analysis, synthesis, and evaluation, or in its revision proposed by Anderson and Krathwohl, higher-order thinking skill is when the activities conducted has already fulfilled the act of analyzing, evaluating, and creating [1]. Selecting the most appropriate teaching methods

and media will help teachers to develop students' higher-order thinking skills. The right task allows students to research and build on the knowledge that could be shared with teammates, tested in real-world scenarios, and applied appropriately [12]. Teachers can implement Problem Based Learning to foster students' higher-order thinking skills. Engaging students in problem-posing activities can improve students' higher-order thinking skills [13].

II. RESEARCH METHODS

This study is a form of qualitative study in which the researchers are the main data collection instrument. The researchers examine why events occur, what happens, and what those events mean to the participants studied [14]. The characteristics of qualitative research are exploring a problem and developing a detailed understanding of a central [15]. Generic or basic qualitative research refers to an approach in which researchers are simply interested in solving a problem, effecting a change, or identifying relevant themes rather than attempting to position their work in a particular epistemological or ontological paradigm [16]. In particular, this study is classified as a case study. The essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result [17]. This study focuses on investigating how teachers implement higher-order thinking skills for young learners in the context of a bilingual classroom.

Qualitative research involves naturalistic data. This type of research attempts to study language learning and teaching in its naturally occurring settings without any intervention or manipulation [18]. This study was conducted in the second grade of Al – Azhar 55 Islamic Primary School in Yogyakarta which involved all students of this grade, two homeroom teachers, and a native speaker, Miss T. There were 21 students in this grade. To get reliable and valid data, this study combined 3 data collecting techniques which were observation, interview, and document analysis of students' work and assessment as triangulation of data. An in-depth interview was conducted with a native teacher and homeroom teachers which enabled researchers to explore the activities implemented in the learning process which were oriented to HOTS. Besides, having an in-depth interview helps researchers to figure out the teachers' ideas relating to promoting HOTS in a bilingual classroom which is hard can be seen during the observation. Furthermore, the primary advantage of in-depth interviews is that they provide much more detailed information than what is available through other data collection methods, such as surveys. They also may provide a more relaxed atmosphere in which to collect information—people may feel more comfortable having a conversation with you about their program as opposed to filling out a survey [19].

III. RESULTS AND DISCUSSION

The result and analysis of this study will be divided into two parts which are (1) promoting HOTS for young learners in a bilingual classroom and (2) its challenges.

A. Promoting HOTS for Young Learners in A Bilingual Classroom

Data from class observation were taken in a science class. Miss T is a native teacher who is in charge of teaching science. She tended to avoid using textbooks or modules in the learning process and preferred to implement hands-on learning in which the teacher would give more opportunities for students to practice more and do individual or group tasks in the teaching and learning process. This teaching method required the teacher to expose students to a directed hands-on activity, a challenging situation, and an open-ended inquiry setting [20]. Exposing students to practice more and observe by themselves makes learning activities lively. Children need hands-on activities to engage in their learning. Concrete materials help them understand and process the meaning [21]. Implementing hands-on learning will lead students to think critically and creatively since they will combine theories and practice or experiment because students' understanding comes not just from the explanation, but also from what they see and hear and, crucially, have a chance to touch and interact with [22]. In implementing hands-on activity, assessment tasks should be administered in an environment that is familiar and comfortable for young learners, and hands-on practice should be provided before the assessment event to reduce test anxiety [23]. In this class, students were exposed to contextual learning in which the topic discussed was related to what they saw and found in their surroundings. Therefore, students were easily engaged in learning and teaching activities.

To promote higher–order thinking skills in a classroom, Florea and Hurjui [2] propose that nurturing the natural curiosity of children about nature and moral issues, in this case, have conducted activities that focus on stimulating children's curiosity, the development of analytical and solving skills problems will train students critical thinking skill. At the beginning of the class, miss T got students' attention when preparing the experiment equipment such as a beaker glass, a candle, matches, baking powder, and vinegar. She asked the students what they were going to do. This question-and-answer activity ran well and got positive responses from students.

A study conducted by Sand and Virginia [24] shows the success of implementing the Water Lab curriculum in one of the public preschools in the USA. The water lab curriculum was implemented to teach science to both native English-speaking students and English Language Learners. This curriculum succeeded in offering an instructional model to teach abstract scientific concepts while developing together science content knowledge and L1 and L2

skills, as well as social skills through participation in a community of learners. This curriculum is designed based on a thematic and topical approach throughout curriculum units that followed the children's intrinsic curiosity and interests in their everyday life experiences. During the learning and teaching activities, students are motivated to learn from personal experiences within the context of meaningful activities and social interactions with peers and teachers. They, as well as can work and learn together with peers since they were interested in the topic discussed.

Before starting the experiment, miss T asked the students what they learned in the previous meeting and, after that, they watched videos about candles and carbon dioxide – science experiments for school kids. Students watched videos enthusiastically and were amazed by what they just watched because in a video they could put out the candle without even blowing it or touching it. The video showed that a man was experimenting by lighting a candle and pouring some vinegar into the beaker glass and adding some baking powder. Then, he put the beaker glass next to the candle as if he was pouring something into the candle and suddenly the candle came off. After watching the experiment video, miss T asked the students' opinions about the video and asked them how it could be. Students tried to give their best answers, then, miss T invited one student to help her do the same experiment while other students watched it enthusiastically. With help from the student, miss T did the same thing as what they watched in the video. Miss T also asked the students why the candle was off. However, no one could answer it correctly. Then, miss T explained to the students why the candle was off when she put the beaker glass next to it. She explained that the chemical reaction is formed when vinegar reacts to sodium bicarbonate in baking powder to form carbonic acid. Then, it falls apart into carbon dioxide. When she put the beaker glass next to the candle (as if she poured something into the candle), carbon dioxide (gas) is escaping out from the beaker class and puts out the candle. Finally, she concluded that there was a physical change in their experiment from liquid (vinegar) and solid (baking powder) to gas (carbon dioxide).

In implementing Higher-Order Thinking for elementary students, teachers design their classroom cultures and environments to give students more opportunities to talk and write with peers as they collaboratively constructed meaning about texts. This was accomplished in a variety of ways including working with a partner or small group [25]. Miss T, then, asked students to sit down with the group of 4 – 5 students. She gave them paperwork like an experiment report. Students were required to complete the task by writing what they just watched. They should write the title of the experiment, hypothesis, procedure, result, and conclusion. This paperwork should be in English. This activity took about 30 minutes. Some students could do it easily, while others found it a difficult task to do. At the end of the class, miss T informed me that next meeting they were going to make an ice cream experiment. When the day to make the ice cream experiment came, miss T and the students did the same procedure as what they did in the carbon dioxide experiment. In an ice - cream experiment, students were learning physical changing from liquid (milk) and solid (sugar and salt) into solid (ice cream).

From the explanation above, what miss T did reflects that she promotes a higher–order thinking skill concept to her students during the learning-teaching process. Those activities will be clearly described as the following,

- ***Remember:*** Apperception by recalling the previous lesson and watching videos relating to the topic discussion 'Physical Changing' (carbon dioxide experiment)
- ***Understand:*** Brainstorming by asking students about videos and other questions relating to the topic ‘Physical Changing’. (‘How can you prove that the gas exists?’, ‘Why does the fire of the candle come out? ‘Why should we put the candle next to the beaker glass to make the fire off?’.)
- ***Apply:*** Practicing what students just watched by doing a science experiment to prove that gas exists although they cannot see and touch it.
- ***Analysis:*** Writing an experimental report in which students are required to write title, hypothesis, procedures, and a result of their experiment.
- ***Evaluate:*** Checking students’ experimental reports and giving them some feedback and points on their reports.
- ***Create:*** Conducting another experiment (making ice cream from milk, sugar, salt, and ice cube) in the following meeting. It is a physical-changing experiment from liquid (milk) and solid (sugar and salt) to solid (Ice Cream).

The act of *remembering* is conducted when students were asked to recall their previous lesson before starting the new one. Students need to build their prior knowledge before learning something new to make the learning effective. Apperception was done by the teacher and was continued by a short discussion after watching the videos, students are required to remember the procedures of the science experiment, the tools used, and the result of it.

Meanwhile, the act of *understanding* is shown when the teacher asked students to relate to the videos they just watched. The teacher aims to investigate students' understanding of the videos and assess their critical thinking. The question words how and why stimulate students to come up with a good answer which makes sense. Barak and Dori [26] regarded critical thinking as a skill that requires taking responsibility and control of one's mind. It involves logical and reflective thought before deciding what to believe and what action to take. By asking them these questions How can you prove that the gas exists? Why does the fire of the candle come out? Why should we put

the candle next to the beaker glass to make the fire come out? The teacher tries to stimulate students to think critically by requiring them to answer those questions as reasonably as possible.

Conducting science experiments based on what they just watched is the implementation of *applying*. Teachers and students follow the procedure to create carbon dioxide. Students are curious to put out the fire without touching or blowing it. They also need to prove that gas exists even though they cannot see or touch it. Therefore, the teacher invites them to do a carbon dioxide experiment to show that gas exists. Higher-order thinking skills are high-order thinking which occurs when the student obtains new knowledge and stores it in his memory, then this knowledge is correlated, organized, or evaluated to achieve a specific purpose. These skills have to include sub-skills such as analysis, synthesis, and evaluation [4] or in the revised Bloom's taxonomy, higher–order thinking skills are implemented when the activities involve the last three levels which are analyzing, evaluating, and creating. This study, thus, reveals that activities conducted in Miss T class have already fulfilled this requirement. Writing reports, checking it, and conducting another science experiment is the implementation of analyzing, evaluating, and creating.

Writing an experimental report is a must activity after conducting every science experiment. Students are required to recall what they just did in the experiment in a report. They need to make their hypothesis before writing the procedures. This activity shows how students apply their critical thinking to write the hypothesis as well as to conclude the experiment conducted. They have to conclude what they have already done in a science experiment and draw the conclusion that carbon dioxide gas exists and can be proved through experiments. The mix of vinegar and baking powder creates carbon dioxide gas and it is shown when it can put off the fire. In this activity, students are required to write their idea relating to their experiment which it is not only to write its procedure but also need to sum up and relate it to the topic as well as they need to investigate what kind of physical change occurred. Anderson and Krathwohl [27] state that teaching for transfer or teaching for meaning involves students not only remembering and understanding but also using knowledge in an increasingly more complex way. It shows that by writing a report, students have already used their knowledge in a more complex way, and it needs complex thinking skills. These skills such as problem-solving, creating, analyzing, evaluating, and others are needed to process the collected information [28] for generating an idea [29]. Therefore, writing a report can be classified as *analyzing* since it requires students to write their hypotheses. In the writing hypothesis, students make predictions or explanations on how to prove that gas exists, and they will investigate it by conducting a science experiment to prove it. Meanwhile, *evaluating* is conducted by giving students feedback and points on their experimental reports. Miss T checked students' reports and wrote some notes to give them feedback and scored it.

Brookhart [1] mentions that the learning activities which define higher-order thinking in terms of transfer in which students not only need to remember what they have learned but also to make sense of and be able to use what they have learned. In the *creating* phase, students are required to experiment with another physically changing experiment. The creation process includes generating, planning, and producing. In this activity, students conducted a new science experiment to make ice cream from sugar, salt, and milk. Then they mixed them and put them into the zip-lock plastic bag. The next step was to mix the ice cube, and salt into the bigger zip-lock plastic bag. Finally, the student put the smaller zip-lock plastic bag into the bigger one and shook it for 5 – 10 minutes. This experiment resulted in ice cream which changes liquid (milk) and solid (sugar and salt) into solid (ice cream).

Promoting HOTS to young learners requires teachers more creative and they should be able to create effective and easy teaching methods to help students understand the material easily. The existence of ICT in the classroom facilitates students to understand the topic discussed, as well as leads their motivation to learn. The Internet and new digital tools facilitate teachers to design new learning spaces and activities. Young learners can act and communicate more effectively and in new ways requiring higher-order thinking skills. Implementing ICT into the learning and teaching process helps them resolve the inherent difficulties of experimentalist education. They bring the habits of thinking they build as they learn through occupations into the activities of adult life, rendering society itself progressively more intelligent and cooperative [30]. The positive impact of information and communication technologies (ICT) will empower the digital generation to learn and build knowledge cooperatively and at a greater speed [31]. The existence of ICT in the learning process gives a significant influence to students to give them a clear description of the topic discussed, 'physical changing from a liquid into gas, and from the liquid into a solid. Learning HOTS through ICT has a high potential of promoting positive learning outcomes due to the various benefits it brings to the table [32]. Many students understand the concept of this physical change easily after watching the videos and they can conduct the experiment based on the video. Carefully designed learning tasks in an ICT-based learning environment can facilitate the performance of operations that can foster higher–order thinking skills [33]. Besides, integrating ICT and hands-on learning helps the teacher to promote HOTS to students easily, therefore, teachers need to provide opportunities for them to both experience and evaluate methodologies, in groups, and as individuals [20]. Jonassen et al. [34] believe that technology can be used for meaningful learning since it can be an information vehicle for exploring knowledge to support knowledge construction, as well as an intellectual partner that supports learning if it helps the learners to reflect on what they have learned and let them construct personal representations of meanings.

B. Challenges

During the learning-teaching process, English still became an issue for some students. Although many of them were able to communicate in English, they were still struggling to fulfill the writing task for their experimental report. Errors in spelling were the most common mistakes found in student experimental reports. Some of the students did not know certain vocabularies such as '*menambahkan*, *menjadi*, *berubah*, and *apinya mati'*. The existence of a homeroom teacher was needed to help them translate those words into English. Homeroom teachers were Indonesian teachers who could speak English well. They also taught students other subjects. Besides teaching, their roles were assisting students during the learning-teaching process moreover when students had issues relating to English. They would help students to translate from English to Indonesia and vice versa. It shows that in a bilingual teaching classroom, instructors will help students to understand the learning content as well as to translate English to students' mother tongue language [9]. It, therefore, can be highlighted that the existence of homeroom teacher comfort students; besides students can always rely on them whenever they face difficulty in learning. Haager et al. [35] propose some of the principles which can be incorporated into teachers' instructions which are providing a warm, safe, nurturing environment, checking for understanding frequently, providing students with choices to help them become self-regulated learners, and assigning meaningful guided and independent practice activities.

The role of the teacher in promoting HOTS to the student is very crucial. When the teacher was sure that students could work on their own, she would let them pay attention to others. Implementing HOTS becomes essential as it can assist them to complete their assignments and learn the subject comprehensively. Consequently, students should be assisted to acquire HOTS; either through the conventional teaching and learning environment or a self-instructional, individualized manual [29]. During the writing experimental report activity, the researchers found that 5 students were reluctant to do the writing. 3 of them put their head on the table and pretended to sleep while other students just had a chat with others and talked about their point Dojo (Class Dojo Application was implemented in this classroom). According to the teachers, this was a common atmosphere when the writing activity was ongoing. However, with the help of the teacher, those students were able to finish their writing tasks. It implies that for some students when they found that the activity put them in a confusing situation, they tended to stop their activity and did something else instead. Writing their experiment report was considered a difficult task for them since they needed to make a hypothesis, wrote the procedures, and concluded their experiment in English. Therefore, students did not like this activity and were not motivated to think. For them, it will be easier and faster to be given a direct answer instead of being asked to think out of the box and to provide rationale afterward [3].

IV. CONCLUSION

Implementing higher–order thinking skills for young learners in a bilingual classroom is possible when teachers can provide supportive teaching media and appropriate techniques as well as integrate ICT in the learning and teaching process. Moreover, ICT can be integrated with hands-on learning teaching to create a joyful and effective learning-teaching process which it also promotes higher-order thinking skills in the classroom. Thus, this study has already revealed that the teacher implements higher–order thinking skills in her class. Promoting HOTS for the second-grade students of Al – Azhar 55 Islamic Primary School in Yogyakarta has already fulfilled all levels of revised Bloom's Taxonomy for the cognitive performance domain which are remembering, understanding, applying, analyzing, evaluating, and creating. However, the challenges to promoting higher-order thinking skills in a bilingual classroom always occur during the learning-teaching process. Students' lack of English ability and their motivation is the most dominant challenge. The existence of Indonesian homeroom teachers will assist them during the learning process by helping them whenever they get difficulty relating to English both spoken and written.

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