Effective teaching for increase higher-order thinking skills (hots) in education of elementary school

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Abstract. Teaching learners to have High-Level Thinking Skills is a challenge in the 21st century, this is because High-Order Thinking Skills (HOTS) becomes a very important part in the world of education, it is expected when students have High-Level Thinking Skills (HOTS) can improve the competitiveness of labor, productivity, added value, and opens job opportunities, thereby High-Level Thinking Skills become very interesting topics to discuss. High-Level Thinking Skills (HOTS) can be trained through Mathematics lessons. This study aims to explain the aspects that must be considered in support of participants educate, these aspects include learning strategies, assessment and classroom environment. This research uses literature method, literature method is a method that uses library sources, articles, journals, books or others as reference source in this writing research.

1. Introduction
Today, especially in the 21st century HOTS is a very interesting topic to discuss, now many countries are preparing their society to face future challenges, competition will become more intense, therefore we must be able to be a decision-making society and solve problems, critical thinking, analysis and creative, these three thinking abilities are part of high-order thinking skills [1]. DeVries, R. in Malathi Balakrishnan, said High-Level Thinking Skills are very important and relevant for educating 21st-century students to deal with real and complex life problems, and often require complex solution [2]. In this case, the Indonesian government has contributed to produce a generation of high-level thinking, it shows that there are three important things that become the agenda or focus in the implementation of K13 namely (1) strengthening character education, (2) strengthening of literacy, and (3) Learning in 21 Century. In the curriculum 2013 can be implemented 21st-century learning reflects four things, first, critical thinking skills, creativity, three communications and fourth is a collaboration. Teachers are the closest positions to learners, thus becoming important for teachers to have knowledge and
skills in teaching so as to create 21st-century learning that produces generations that have High-Level Thinking Skills for future learner’s success [3].

Improving students’ higher-order thinking skills is a collective experience; one teacher of a specific subject cannot alone improve the higher-order thinking skills, and it is a collaborative process between all subjects’ teachers and can be taught for all levels of studying. [4] Moreover, Benjamin argues that these skills can be developed in a cumulative fashion as students’ progress through their courses and subjects and other experiences they get from their institutions. As well, by including their subjects by problem-solving, critical thinking and decision-making activities will help students enhance their higher-order thinking skills. [5]. There are several characteristics of higher-order thinking skills, namely: being nonalgorithmic, being complex, generating multiple solutions, involving nuanced judgment, employing multiple-criterion, involving uncertainty, involving self-regulation in the thinking process, imposing meaning, solving problems effortfully Resnick in Jaelani [6]. Performing thinking that involves analysis, synthesis and evaluation in the Bloom taxonomy [7]. In addition, the higher-order thinking skills also involve analysis, synthesis, and creation; in other words, the higher-order thinking skills involve three upper parts of Bloom taxonomy that have been revised [8]. The activities of higher-order thinking skills with such characteristics might be trained to the students through practice until the students master them. one of the subjects that can train High-Level Thinking Skills is a mathematics lesson because in mathematics lessons require children to be able to solve problems, analyze and think critically. there are 3 factors that influence HOTS, first is learning strategy, Teaching and learning methods refer to principles, methods, patterns, and techniques that teachers apply to manage students, learning and to achieve classroom management goals [9].

These approaches promote the use of higher order thinking skills as well as cognitive development. Among others, teachers could apply various strategies, such as questioning techniques, problem-solving activities, project-based learning, thinking tools, simulations, discussions, role play and gradual increment of the level of difficulties of tasks. For example, student-centred learning (SCL) has been an effective approach to enhance the learning experience for students Weimer in Tajularipin [10] (emphasizes, teaching and higher order thinking requires commitment to class-discussion, debate and problem solving,) the second is assessment, there has been a demand for better methods of assessing students’ achievements in order to measure what students can do with what they know, rather than simply finding out what they know [11]. As well as to fulfil the great demands for educators and policy makers for tests that reflects and measures the students’ learning. Assessment has three main purposes: to assist learning, to measure a particular student’s achievement and to evaluate the whole program. So that, without good assessment techniques it is difficult to ascertain whether reforms in instruction and curriculum are working. The suitable assessment is one that can be used or leads to improvement in student’s learning. Moreover, it can reveal the student’s weakness and strength areas; the strength area to be enhanced and the weakness area to be treated. The third is Classroom environment, Classroom environment refers to physical atmospheres such as tidiness, cleanliness, light, and size, and psychological atmosphere such as safety, warmness and good relationship, and freedom in expressing ideas and feelings [12].

2. Method
This paper seeks to present information on the issue related to factor effecting to enhance HOTS base on the literature review of previous research by other scholars. By using analysis technique, issues and finding reviewed by schoolers discussing factor effecting to enhance HOTS will be presented in form of a table in this paper as shown below.

3. Result and Discussion
There are some strategies to encourage higher order thinking skills among students. Some strategies that teacher can implement are the instructional design developed, with the filing of creative problems can generate awareness for students that not all the problems have only one correct solution. This is what can trigger and train the students’ creativity in mathematics learning, and creativity are part of HOTS [23]. Problem-based learning helps to develop higher order thinking skills. The most significant HOT skills of students are the skills needed for problem solving. The favourable environment for
The development of such skills can be created through the use of the Problem-based Learning (PBL) [24]. The inquiry-based instruction used for teaching and learning provides an active setting for students that provides essential scaffolding based on each student’s readiness and current ability. Such learning environments are foundational to differentiating instruction and challenging students to think critically and analytically [24].

### Table 1. Finding of research

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<tr>
<th>No</th>
<th>Title of Research</th>
<th>Findings</th>
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<td>1</td>
<td><strong>Learning Strategies</strong></td>
<td>The results of data analysis showed that the instructional design developed is effective for improving students’ HOTS. This is due to the filing of an open question (creative problem) through worksheet make students more challenged to explore the various possibilities of ideas that can be used to solve the problem [13]. Problem-based learning helps to develop higher order thinking skills [14].</td>
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<td></td>
<td>• Developing Instructional Design to Improve Mathematical Higher Order Thinking Skills of Students</td>
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<td>• Higher-Order Thinking Development through Adaptive Problem-based Learning.</td>
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<td></td>
<td>• The Relationship of Teacher-Facilitated, Inquiry-Based Instruction to Student Higher-Order Thinking. School Science and Mathematics.</td>
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<td>2</td>
<td><strong>Assessment</strong></td>
<td>Assessments should be geared toward appreciating and merit-ing HOT ability instead of recognizing only content mastery. It has become a norm those content goals are prioritized over thinking goals [16].</td>
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<td>• Challenges in wide scale implementation efforts to foster higher order thinking (HOT) in science education across a whole wide system. Thinking Skills and Creativity</td>
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<td>• Assessment Techniques and Students’ Higher-Order Thinking Skills.</td>
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<td>• The Challenges of Junior High School Mathematic Teachers in Implementing the Problem-Based Learning for Improving the Higher-Order Thinking Skills</td>
<td>Performance-based assessments afford us with information about the students’ daily improvement, and insight into the process of learning because this type of assessment requires students to demonstrate that they have mastered specific skills and competencies by performing or producing something. so that, the writer believe that using this approach of assessment will be helpful in improving and evaluating students’ higher-order thinking skills. The students have difficulties in solving the higher-order thinking skills-based problems because they are not accustomed to solving the contextual problems and these problems will various multiple phases in order to be solved. The situation can be overcome by implementing the problem-based learning with an orientation toward the HOTS. In addition, the design of the instrument that will be used for measuring the students’ learning achievements should refer to the higher-order thinking skills as well whether the instrument might be used in the daily examination, in</td>
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Chudowsky and Glaser in Yosef aAbosalem, assessment has three main purposes: to assist learning, to measure a particular student’s achievement and to evaluate the whole program. So that, without good assessment techniques it is difficult to ascertain whether reforms in instruction and curriculum are working. The suitable assessment is one that can be used or leads to improvement in student’s learning. Moreover, it can reveal the student’s weakness and strength areas; the strength area to be enhanced and the weakness area to be treated. Some test formats for measuring higher order thinking skills are multiple-choice Items, performance tests, portfolios, classroom assessment of higher order thinking skills [25].

Classroom environment were differed and variety, the variables of classroom environment affecting HOTS can be divided into three factors; 1) Classroom climate; refers to learning environment for both physical atmosphere such as tidiness, cleanliness, light, and size, and psychological atmosphere such as safety, warmness and good relationship, and freedom in expressing ideas and feelings, 2) Teaching and learning methods; refers to principles, methods, patterns, and techniques that teachers apply to manage students’ learning and to achieve classroom management goals and 3) Teacher behavior; refers to the actions of teachers in classrooms to motivate, facilitate, and encourage students for performing their efficient works [26].
4. Conclusion
High-Level Thinking Skills are a much-needed skill in the 21st century, a teacher must prepare his knowledge of factors that can influence high-order thinking skills, The First factor is learning strategy, methods and techniques of learning, the use of strategies appropriate to the material and class level can explore the potential of the students, based on the results of the above review strategy that can be used for HOT is PBL, one strategy that can be applied is PBL, instructional design developed and inquiry. how a learner has curiosity, passion, and independence. The second factor is assessment of assessment, the research shows that the concept of high-level thinking in Bloom's Taxonomy is lost from mathematics teacher interpretation of high-order thinking ability is level of student familiarity with algorithm, problem solving method. In this study, the teacher's understanding of Bloom's Taxonomy does not seem to affect teachers' perceptions of high-order thinking skills or teacher's efforts to create high-standard thinking questions. The third factor is the classroom environment, the management of a good classroom environment can make students comfortable in learning, such as the arrangement of chairs, paint colors, circulation of the tracks, and the number of students, the number of students who are too much can make the class becomes not conducive.

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