INTRODUCTION

In this progressive era, it demands every individual, especially learners to be able to compete in various things of life when facing the 21st century. Partnership for 21st Century Learning or P21 has developed 21st century learning framework which requires learners to mastering skills, knowledge and ability in technology, media and information, learning and innovation skills, and life and career skills (P21, 2015). One of the aspects that closely related to learning is learning and innovation skills. In which teachers are required to design learning that can improve learners’ ability to think critically and solve problems.

Aspects of understanding, application, and reasoning in the realm of cognitive ability as applied to TIMSS can be used to demonstrate students’ ability to think. In these three aspects, aspects of understanding and application included in basic thinking skills. Aspects of reasoning are included in higher-order thinking skills. Based on the TIMSS results, it can be said that the students’ higher-order thinking skills are still low. This can happen because the students’ learning process is less motivated in improving the higher order thinking skills (Pratiwi and Fasha: 2015). Friedman (2006) stated that entering the 21st century, the paradigm shift to student-centered learning, and learners needs to be equipped with Higher Order Thinking Skill (HOTS) (Wilson, 2000; Lawson, 2002; Zohar, 2004).

The current curriculum of Kurikulum 2013, in learning use constructivistics-based methods or models that involve scientific approaches such as: Problem Based Learning (PBL), also in learning learners should be able to find and link concepts with discoveries that have been made through Contextual Teaching and Learning (CTL).

DISCUSSION

Sains Learning

Sains can also be interpreted as Ilmu Pengetahuan Alam (natural sciences) (Bundu, 2006: 9). Sains can be learned in elementary schools through Sains learning. Sains Learning in elementary schools becomes a way to better understanding the knowledge about living beings and their environment.

Subali, et al (2009: 1) stated that Natural Sciences or Sains concern in understanding the various natural phenomena systematically.

In essence, Natural Sciences learning in elementary school or Sains learning has four
dimensions of attitude, process, product, and application. Attitudes is related to curiosity about objects, natural phenomena, living things, and causal relationships that cause new problems, that can be solved through the correct procedure, natural sciences is open ended. The process is related to problem-solving procedures using scientific methods that include formulating hypotheses, designing and conducting investigations, collecting and analyzing data, and drawing conclusions. Natural Sciences product are concepts, principles, laws, and theories. Applications is related to the application of scientific methods and Sains products in everyday life. The above four dimensions are complete Sains features that can not be separated from one another. Therefore, Sains learning should cover these four aspects above.

Sains process leads to series of logical steps done by the scientist when he wants to answer his curiosity about nature, when he wants to find a solution to the sains problem he faces. Observation, problem identification, hypothesis formulation, experimenting, recording and processing data, truth testing, and drawing conclusions are examples of process elements that scientists often experiment with (Carin & Sund, 1989; Jinks J., 1997).

Higher Order Thingking Skill (HOTS)

The concept of higher order thinking (HOT) originated from the Bloom (1956) taxonomy of cognitive domain (Forehand, 2010), these cognitive domains involves knowledge and the development of intellectual skills and in hierarchically ordered from concrete knowledge to abstract (Pappas et al., 2012).

HOTS or higher-order thinking skills is not only oriented to memorization and understanding of concepts, but rather to analysis, evaluation, and creation. this ability is very necessary to teach to learners. There are several indicators that included in higher-order thinking skills by Anderson & Krathwohl (2001) which are analyzing, evaluating, and creating. Newman and Wehlage also (2011) stated that “HOT requires students to manipulate informations and ideas in ways that transform their meaning and implications, such as when students combine facts and ideas in order to synthesize, generalize, explain, hypothesize, or arrive at some conclusion or interpretation. Models and approaches that can spur high-order thinking skills in learners are Problem Based Learning (PBL) and Contextual Teaching and Learning (CTL).

Problem Based Learning (PBL)

Problem Based Learning is a pedagogical approach that encourages those who take part in its processes to act both as supportive change agents working in collaboration with colleagues, and also as individuals to use their creativity in finding solution to practical problems. The process of questioning the issues and finding problem solutions using the creative spirit are also challenging for those who teach and deliver PBL based curriculum, and poses some fundamental question. (Armitage: 2015)

According to Arends (2008: 41), PBL is learning that presents the variety of authentic and meaningful problem situations to students that can serve as a milestone for investigation. While Sanjaya (2009: 214) also believed that PBL can be defined as series of learning activities that emphasize the process of solving problems scientifically. According to Shoimin (2014: 129), Problem Based Learning (PBL) learning model is a model of learning that can train and develop the ability to solving problems that oriented to the authentic problems of the students’ actual life.

Suyadi (2013: 137-139) stated that there are six steps to be able to implement PBL well, which are:
(1) Realizing Problems, (2) Formulating Problems, (3) Formulating Hypotheses, (4) Collecting Data, (5) Testing Hypotheses, (6) Determining Completion Options. Problems are the gap between reality and hope. Not all learners can be aware of any problems. If the learner is aware of a problem then he/she is sensitive to the situation. Thus in this stage, they are trained to higher-order thinking. Although can improve the higher-order thinking, PBL has several disadvantages.

The disadvantages of PBL are as follows:
(a) if students experience failure or lack confidence with low interest, students are reluctant to try again; (b) The PBL takes sufficient time to prepare; and (c) poor understanding on why problems are solved, so that students are less motivated to learn. (Sanjaya 2008: 221; Todd in Zabit (2010: 23).

Contextual Teaching and Learning (CTL)

Research conducted by Ahri (2013) and Rubini (2014) showed that CTL approach is one of the approaches that can be applied to improve the ability of higher-order thinking of learners. Johnson (2002) said that Contextual teaching and learning engages students in significant activities that help them connect academic studies to their context in real-life-situation. By making these connections, students see meaning in schoolwork. When students formulate projects or identify interesting problems, when they make choices and accept responsibility, search about information and reach conclusions, when they actively choose, order,
organize, touch, plan, investigate, question, and make decisions to reach objectives, they connect academic context of life's situations.

The CTL approach has seven main components (Nurhadi, 2002: 5), which are Constructivism, Inquiry, Questioning, Learning Community, Modeling, Reflection, and Authentic Assessment. The following describes the seven components of CTL approach:

a. Constructivism
   Constructivism is the philosophy of CTL approach, that knowledge is built by humans little by little, that results are extended through narrow (tight) context. In a constructivist view, “acquiring strategy” takes precedence over how many knowledge that learners gain and remember.

b. Inquiry
   The inquiry is a core part of CTL-based learning activities. Knowledge and skills that acquired by learners are not expected to result in remembering a set of facts, but the result of finding themselves. The inquiry cycle is observation, questioning, hypotheses, data gathering, and conclusion.

c. Questioning
   The knowledge that someone has, always start from “ask”. Questioning is the main learning based on CTL. Questioning is seen as teachers’ activity to encourage, guide, and assess the thinking of learners. The question in the classroom can be applied between learners with learners, between teachers with learners, between learners with others who come to class and so forth.

d. Learning Community
   Learning community occurs when there is two-way communication process. In a learning community, there are two or more groups are involved in the communication of learning of mutual learn. A person involved in a learning community activity provide the information needed by his/her conversational partner and at the same time asks for the required information from his/her study partner.

e. Modeling
   In a lesson, there is always a model that can be imitated. The teacher gives a model on “how to learn”.

f. Reflection
   Reflection is also an important part of learning with CTL approach. Reflection is a way of thinking about what was just learned or thinking back on what has been done in the past. Learners settle what they just learn as new knowledge structures, which are enrichment or revision of previous knowledge.

g. Authentic Assessment
   Assessment is the process of collecting various data that can provide a depiction of the learning development of learners. A depiction of the learning development of learners needs to be known by the teacher in order to ensure that learners experience the learning process correctly. Correct learning should indeed be emphasized on helping learners to learning how to learn, rather than emphasizing on gaining information as much as possible by the end of the learning period.

**Assessment Based on HOTS**

The Kurikulum 2013 curriculum now requires HOTS-based assessment. When the former may still LOTS (Low Order Thinking Skill) but now teachers are required to prepare and use HOTS assessment for learners.

The reason for the learning assessment directed to HOTS according to Kemdikbud (2017) is because 21st century challenges are more complex. How learners can face the variety of challenges, one of them is by study through learning in school, whose assessment is also directed toward higher order thinking. With the aim that learners are accustomed to solving problems.

HOTS-based assessment stage is first must be developed assessment instruments based on HOTS, like the development of instruments that have been done by Pratiwi and Fasha (2015). Further, Pratiwi and Fasha said their HOTS instruments have been able to measure higher order thinking skills because achieving the success of an assessment instrument with HOTS score of 73.3%.

<table>
<thead>
<tr>
<th>Table 1. Cognitive Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOTS</td>
</tr>
<tr>
<td>Analyzing (C4)</td>
</tr>
<tr>
<td>MOTS</td>
</tr>
<tr>
<td>LOTS</td>
</tr>
<tr>
<td>Source: Anderson &amp; Krathwohl (2001)</td>
</tr>
</tbody>
</table>

From table 1 there are levels of cognitive dimension. Which included in HOTS C4, C5, and C6 are analyzing, creating, and evaluating.

1. Analyzing
   That is to describe the parts and determine
the connections. Included analyzing i.e. = differentiate, focus, select, integrate, define, structure, define bias/views/value/attention

2. Evaluating
   That is making consideration based on criteria and standards. Included evaluating which is coordinating, monitoring, testing, weighing/considering

3. Creating
   Creating means installing elements to form a functional unity; included forming new patterns/structures, proposing hypotheses based on criteria, completing the task, finding a product.

Depdiknas (2017) HOTS questions measure ability:
1. transferring one concept to another concept,
2. processing and applying information,
3. looking for links of different information,
4. using the information to solve the problem,
5. examining ideas and information critically.

Developing HOTS stimulus according to Depdiknas (2017)
   a. Choose some information, images, graphics, tables, discourses, etc. that have a linkage in a case.
   b. Stimulus should require the ability to interpret, seek relationships, analyze, conclude, or create.
   c. Select cases/problems which is contextual and interesting (current) that motivate learners to read. Exceptions for subjects of Language and History may not be contextual.
   d. Directly related to the question (main problem), works.

   Teachers should be able to develop an assessment that actually measures the ability of C4, C5 and C6 of learners by taking into consideration the principles of HOTS measurement and stimulus above.

CONCLUSION

To meet the demands of the 21st century, learning must be designed in such a way that the learners’ skills to higher order thinking can also be better. Learning that can increase HOTS of learners is by Problem Based Learning and Contextual Teaching and Learning. If the teacher’s model or approach is appropriate, then the assessment should also be appropriate. Appropriate assessment to develop HOTS learners is the one that can measures C4, C5, and C6. with proper learning and judgment, the higher order thinking skills of learners can be well realized.

REFERENCES


Rubini, B dan Permanasari, A. 2014. The Development of Contextual Model with Collaborative Strategy in Basic Science
Course to Enhance Students’ Scientific Literacy. *Journal of Education and Practice.* Vol 5, No.6


