

Analysis of The Elementary School Teacher's Need in the Implementation of HOTS (*Higher Order Thinking Skills*) based on Mathematics Learning

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Abstract: The education system in Indonesia by means of Curriculum 2013 policy underlines HOTS is a skill required to be mastered by elementary education students. This research is the preliminary study step in research and procedures development (R & D) by Borg & Gall. This study is limited to the analysis of that elementary school teachers need to implement HOTS based mathematics learning. The research is descriptive research, using a qualitative approach. The method of data collection uses the questionnaire. The subjects of the research are 97 teachers of the elementary education in the academic year 2017/2018 in East Java. Descriptive and content analysis is used by the writer to analyze the technical data. The result of the study shows that 1) teacher understands the concept and importance of applying HOTS to the mathematics learning in elementary education 2) Teachers have implemented HOTS on mathematics learning in elementary education. 3) teachers are still having some difficulties in setting up HOTS assessment on mathematics learning in elementary education 4) teachers need the assessment book of HOTS school-based mathematics learning for elementary school as a learning resource of the preparation of the mathematics learning assessment instrument.

1 INTRODUCTION

Learning in the 21st century, requires students to integrate and use knowledge in dealing with daily life problems (Fadel et.al. 2007). This skill is called Higher Order Thinking Skills (HOTS). In addition, this skill is very important in the preparation of students to face global competition (MEA). HOTS is a cognitive skill to transfer information that obtains problem-solving (Lewis & Smith, 1993; Elias, 2014; Thomas and Thorn, 2009). Therefore, the HOTS definition has three aspects. They are HOTS as knowledge transfer, HOTS as critical thinking skill and HOTS as the problem-solving skill (Brookhart, 2010). HOTS as transfer knowledge refers to the level of Taxonomy Bloom (1956) was revised by Anderson & Krathwohl (2001) i.e. analysis (C4), evaluation (C5) and creation (C6) (Transkley, 2003; Liu, 2010; Fisher, 2010). At the level of analysis, students are required to have the ability to think to specify aspects/elements of a context. At the

evaluation stage, students are required to have the ability to make decisions based on facts/information. At the stage of creation, students are required to have the ability to think and construct ideas. HOTS implementation in the learning process means that the learning process should provide experiences for students to solve the problem. Therefore, HOTS implementation needs to train since elementary education.

The education system in Indonesia by means of 2013 Curriculum Revision Edition is character education towards HOTS (Permendikbud, 2017). The cognitive domain will be the HOTS to be achieved in the learning objectives. The preparation of instructional designs, learning models, teaching materials and assessments compiled by teachers should require students to reach HOTS.

In learning mathematics in elementary education, HOTS concept is directly proportional to the purpose of elementary mathematics learning. The purpose of learning mathematics in elementary education is so that students can think critically,

creatively, rationally, and can solve problems in everyday life (Shadiq, 2014; Susanto, 2013; Hamzah & Muhlisrarini, 2014). So that the development of HOTS in mathematics learning is very important to be applied in elementary education (Apino & Retnawati, 2017). However, the fact shows that the results of HOTS mathematics in Indonesia are still low. The low HOTS of Indonesian students is shown based on the results of the Trends in International Maths and Science Study (TIMSS) study organized by the International Association for the Evaluation of Educational Achievement (IEA). TIMSS data in 2011 (Mullis, et. al. 2012) shows that on the cognitive dimension, Indonesia is ranked 38 out of 42 participating countries.

The results of the study, supported by several studies in Indonesia which analyzed HOTS students in mathematics learning in elementary education which were classified as still low (Piltena, 2010; Putri & Zulkardi, 2018). There are various studies to improve HOTS in learning mathematics in elementary educations (Andriani et. al., 2018; Lukitasari et. al. 2018; Suwarsi et. al. 2018). But the results of the study are still in a small scope and have not been used for reference in other elementary educations.

HOTS can be achieved through teacher transfer in HOTS-based learning processes and HOTS-based learning assessments (Wall, 2015; Art-in, Sitthipon, 2012). Both components are mutually sustainable. Therefore, the teacher must understand the HOTS concept, implement HOTS in learning and measure HOTS to students through HOTS-based assessment instruments.

Based on this, the purpose of this study is 1) to determine the teacher's perception about understanding and mastering the HOTS concept in the 2013 curriculum; 2) the determine the implementation of HOTS-based mathematics learning the process and; 3) to determine HOTS-based elementary education mathematics assessment.

2 METHOD

This research is the preliminary study step in research and procedures development (R & D) by Borg & Gall. This study is limited to the analysis of that elementary school teachers need to implement HOTS based mathematics learning. The research is descriptive research, using a qualitative approach.

The subjects of the research were 97 teachers of the elementary education in the academic year 2017/2018 in East Java. Whole, the Elementary

Teacher consists of 26 teachers for grade 1, 32 teachers for grade 3, 15 teachers for grade 4, and 34 teachers for grade 5. The overall education background of elementary school teachers consists of 76 elementary school teachers having Bachelor level education and 21 elementary school teachers having a Magister level of education. While for teaching experience, 23 teachers have already had elementary school teaching experience for 7-10 years, 42 teaching experiences for 3-6 years, 32 teaching experiences for 1-2 years.

The method of data collection is questionnaire. Every questionnaire consists of 3 aspects i.e. teachers understanding towards HOTS-based mathematics learning the concept in 2013 Curriculum, implementation and evaluation of HOTS-based Mathematics elementary education lesson. The number of questionnaire items is 10 statements. We use descriptive and content analysis as the techniques to analyze data. Below are the question items of the questionnaire about teachers' HOTS based mathematic instructional design at elementary education.

Table 1: The description of research instrument.

Number	Aspect	Question Number
A	Teacher's understanding toward concept HOTS based mathematic instructional design at elementary education in 2013 curriculum	A-1, A-2, A-3
B	The implementation of HOTS based Mathematic instructional process	B-1, B-2, B-3
C	assessment of HOTS based mathematic instructional design at elementary education	C-1, C-2, C-3, C-4, C-5

Each item is followed by four answer choices; they are Strongly Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS). The teachers were free to choose one of the choices based on the *status quo* in each school.

3 RESULT DAN DISCUSSION

Based on the results of the questionnaire analysis, we divide the need of teacher's in elementary school into 3 aspects: (1) teacher's understanding toward HOTS based mathematic instructional design concept at elementary education in 2013 curriculum;

(2) The implementation of HOTS based Mathematics instructional process, (3) HOTS based learning assessment.

3.1 The Teachers' understanding towards HOTS based on mathematic instructional design at elementary education in 2013 curriculum

Based on the results of the questionnaire analysis, it found information about teachers' understanding towards the concept of HOTS based mathematic instructional design at elementary education in 2013 curriculum. This aspect consists of three statements: the teacher's understanding of the HOTS concept of mathematics learning in Elementary education (A-1), the teacher's understanding of government policy in the 2013Curriculumon HOTS in Elementary Mathematics Learning (A-2) and teacher's understanding of the importance of HOTS in mathematics learning in the elementary education. The finding indicated can be seen in Figure 1.

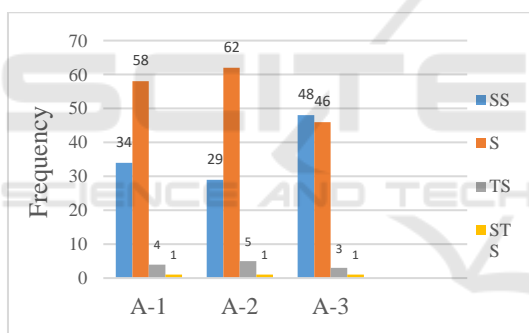


Figure 1: The teachers' understanding towards HOTS in Curriculum 2013.

Based on figure 1, shows data about teachers' understanding of HOTS concepts based on the instructional design in elementary education in the 2013 Curriculum. Based on the analysis of point A-1, it shows that 58 teachers agree that teachers understand the concept of HOTS in elementary education mathematics learning in the 2013 curriculum, 34 teachers stated strongly agree, 4 teachers stated disagree and 4 teachers stated strongly disagree. Item A-2 shows 62 teachers agree that teachers understanding government policy in the 2013 Curriculum on implementation HOTS in mathematics learning of elementary education, 29 teachers stated strongly agree, 5 teachers stated disagree and 1 teacher stated strongly disagree. Item

A-3 shows 46 elementary education teachers agree on the importance of implementing HOTS in mathematics learning of elementary education, 48 teachers agreed, 3 teachers stated disagree and 1 teacher stated strongly disagree. Based on the analysis it can be concluded that the most teacher has understood the concept of HOTS in elementary education mathematics learning of 2013 Curriculum. This is in line with the previous research which states that teachers must understand and be able to develop learning HOTS management that can increase (Art-in, Sitthipon, 2012).

3.2 Teachers' perception towards the implementation HOTS based on mathematic instructional design at elementary education

Based on the results of the questionnaire analysis, it found information about implementation of HOTS based mathematics instructional of elementary education. This aspect consists of three points of statements in the questionnaire, namely teachers' mastery of HOTS based mathematic instructional process at elementary education, the implementation of the learning process of mathematics that accommodates HOTS (B-2), and HOTS achievement of mathematics learning process in elementary education (B-3). The finding indicated can be seen in figure 2.

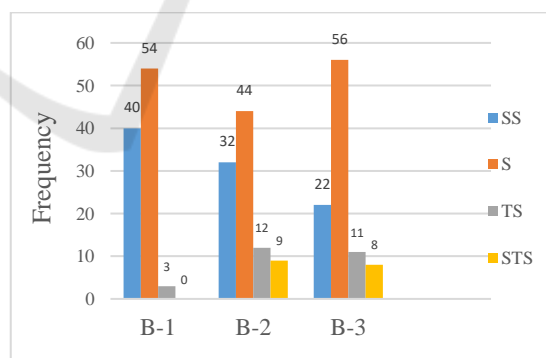


Figure 2: The teachers' perception towards the implementation HOTS.

Figure 2 shows that the teachers' perceptions of HOTS implementation in mathematics learning of elementary education. Based on the analysis of point B-1, it shows 54 teachers agreed that they need to use HOTS-based mathematics learning strategy in elementary education, 40 teachers stated strongly agree, and 3 teachers stated disagree. Item B-2

shows 44 teachers agree that HOTS has been implemented in learning mathematics in elementary education, 32 teachers stated strongly agree, 12 teachers stated disagree and 9 teachers stated strongly disagree. Item A-3 shows 56 teachers agree that some students have not reach HOTS, 22 teachers stated strongly agree, 11 teachers stated disagree and 8 teachers strongly disagree. Based on the analysis, it can be concluded that HOTS has been implemented in the learning process in elementary education. This is in line with the previous research which states that most teachers have implemented HOTS in elementary education mathematics learning (Piltena, 2010).

3.3 Teachers' perception towards HOTS-based on Mathematics Learning Assessment

Based on the results of the questionnaire analysis, it is obtaining data about the needs of teachers in preparing HOTS-based mathematics learning assessment. The questionnaire instrument in this aspect is divided into 4, they are teacher's understanding of the compilation of HOTS based mathematics learning assessment (C1), the feasibility of the HOTS-based elementary-mathematics learning appraisal instrument (C-2), the availability of internal guidance of HOTS-based mathematics learning compilation (C-3) and the need for the developing HOTS-based mathematics learning curriculum development book (C-4). The finding indicated can be seen in Figure 3.

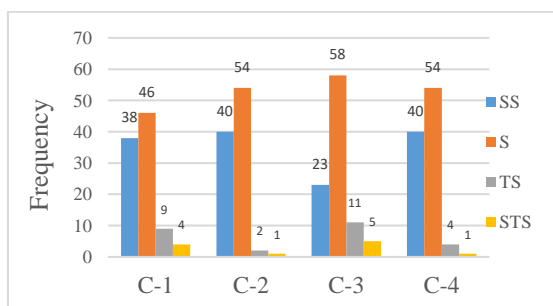


Figure 3: The teachers' perception towards the assessments HOTS.

Figure 3 shows that the teachers' perceptions of the HOTS-based elementary mathematics learning assessment. Based on analysis of point C-1, 46 teachers agree that the teacher found difficulties in preparing the assessment of elementary education mathematics learning, 38 teachers stated strongly agree, 9 teachers stated disagree and 4 teachers

expressed strongly disagree. Item C-2 shows 54 teachers agree that the instrument has not measured HOTS in mathematics learning of elementary education, 40 teachers stated strongly agree, 2 teachers stated disagree and 1 teacher stated strongly disagree. Item C-3 shows 58 elementary teachers agree that the assessment guidelines and assessment books that used for HOTS-based assessment instruments compilation have not supported, 23 teachers stated strongly agree, 11 teachers stated disagree and 5 teachers strongly disagree. Item C-4 shows 54 elementary education teachers agree that need to develop assessment book that used to compile HOTS-based assessment instruments, 40 teachers stated strongly agree, 11 teachers disagree, and 5 teachers strongly disagree.

Based on the analysis, it can be concluded that the assessment used in elementary education mathematics learning has not been able to assess HOTS. However, to measure HOTS achievement, HOTS-based assessment instruments are needed (Saul, C. & Wuttke, H., 2011). In addition, the results of this study indicate that it is necessary to develop a HOTS-based on mathematics learning assessment book. Therefore, the next research that will be investigated by the researcher is the development of HOTS based mathematics learning assessment book.

4 CONCLUSIONS

The results can be concluded that 1) teachers understand about the concept and importance of applying HOTS to the mathematics learning in elementary education, 2) teachers have implemented HOTS on mathematics learning in elementary education, 3) teacher still having difficulty in setting up HOTS assessment on mathematics learning in elementary education, 4) teacher need the assessment book for mathematics learning based on HOTS as a source of instrument preparation. Therefore, the implication of this research is the development of elementary mathematics learning assessment books based on HOTS.

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