

# Need Analysis of HOTS Based Teaching Books in Mathematics Learning Courses

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## ABSTRACT

This article aims to explain the results of the analysis of the needs of HOTS-based teaching books of math learning courses. The data of this analysis was obtained by spreading the questionnaire using google form and the results of discussions with lecturers of mathematics courses in the elementary educational study program FKIP Unsri. The results of the data from google form are filled by 83 students semester 3 academic year 2020/2021 the elementary educational study program, then analyzed using descriptive analysis. The object of the study discussed in this article consists of 1) HOTS in the curriculum 2013, 2) the needs of students as prospective teachers in elementary school regarding HOTS-based teaching books on math learning courses in elementary schools. This need analysis results that 1) Curriculum 2013 expects HOTS-based learning to be used to be given to students and teachers trained to master HOTS-based learning, 2) Students of the elementary educational study program program need HOTS-based teaching books that can be applied to mathematics learning courses in elementary schools, as knowledge and understanding to prepare to become classroom teachers. Thus, it can be concluded that HOTS-based teaching books on mathematics learning courses in elementary school need to be developed.

**Keywords:** *Need Analysis, Teaching Books, HOTS, Mathematics Learning.*

## 1. INTRODUCTION

High-level thinking skills or better known as Higher Order Thinking Skills (HOTS) in learning math is some of the skills that students should have. HOTS means a high level of thinking ability. These characters can be developed through school culture. One way is to get used to problem-based learning so that students get used to solving problems by developing higher-order thinking skills[1]. The term first appeared as one of the thinking fruits of an American educational psychologist, Benjamin Samuel Bloom [2] According to Saputra [3] HOTS is a student's thought process at a higher cognitive level developed from various cognitive concepts and methods and learning taxonomy such as problem-solving methods, bloom taxonomy, and taxonomy of learning, teaching, and assessment.

Annuuru, et.al [4] that high-level thinking is a stage of thinking to train students' cognitive abilities at a higher level, namely students can analyze, evaluate and provide an assessment of the facts that are learned and can combine facts and ideas so that they can create something new based on what has been studied in a creative.

HOTS lead to the ability to apply knowledge, skills and values in reasoning, reflection, problem solving, decision making, innovating and creating new things [5]. HOTS requires students to do something about these facts. Students must understand, analyze each other, categorize, manipulate, create new ways creatively, and apply them in finding solutions to new problems [6]

Results of the study of PISA (Programme for International Student Assessment) conducted by OECD show that the average score of mathematics literacy of Indonesian children is still under the international standard [7]. HOTS ability is one of the requests in the 2013 curriculum. The 2013 Curriculum Developers it is believed that integrated thematic learning is one of the most effective teaching models (highly effective teaching model). In addition, integrated thematic learning is considered capable of accommodating and touching in an integrated dimension of emotion, physical, and academic [8].

The main purpose of the curriculum 2013 is to develop of a balanced domain of attitudes, knowledge and skills in students [9]. Learning in the 2013

curriculum in elementary schools is applied to a thematic system. Thematic learning emphasizes the involvement of students in the active learning process in the learning process so that students can gain direct experience and are trained to be able to find out for themselves the various knowledge they are learning [10]. The curriculum 2013 implemented in Indonesia aims to improve the quality of human resources and the nation's competitiveness because the rapid development of knowledge, technology and language [11].

From that explanation, HOTS skills are the job of teachers first that will train students to have those skills. The importance of teachers who have the ability to produce students who also have HOTS skills. This teacher's task is not only to be able to solve HOTS questions, but from the preparation of materials that are guided on the curriculum, learning achievements, then making and composing HOTS questions as evaluations related to the material for the achievement of learning.

HOTS in mathematics learning is expected to be mastered by students since elementary school. In the course of elementary education one of them is a math learning course. This course discusses the mathematics learning discussed in elementary school from curriculum analysis, then the study plan to the making of the question as an evaluation. Learning is a system consisting of various components that are interconnected with each other. These components include: purpose, material, method and evaluation. This math learner will be inserted HOTS in the material evaluation section.

Research result from [12] students who are in the moderate category tend to answer directly to the questions asked so that they are not accompanied by the nature or understanding first. But when answering, the answer has been analysed but not accompanied by the results of the conclusion or the final answer method.

[13] said that the development of HOTS in the learning process will have many benefits for students. This confidence in mathematics increases, and student learning achievement on non-routine issues that demand HOTS increases. An inductive reasoning strategy is related to HOTS in the aspect of applying because this strategy requires students to build understanding based on their observations of specific examples [14].

The problems are found from the results of discussions with lecturers and based on questionnaires distributed to students using Google form which is the basis of the author to analyze the needs of HOTS-based teaching books on mathematics learning courses in the elementary educational study program FKIP Unsri. HOTS-based teaching books are one of the ways used to help third-semester students, academic year 2020/2021 achieve learning goals. This HOTS-based teaching book to be designed is systematically and structured. The

teaching book will be designed to support the 2013 Curriculum which includes HOTS with problem-solving components namely problem solving, decision making, critical thinking and creative thinking.

Based on this background, this article discusses the analysis of the needs of HOTS-based teaching books in mathematics learning courses in elementary school study programs PGSD FKIP Unsri.

## **2. METHOD**

This research is a qualitative descriptive study using survey methods conducted in August 2020 in the PGSD FKIP Unsri study program. The research population is all students of the third semester of the PGSD FKIP Unsri study program who take math learning courses in low grades, with a total of 84 students. The data collection technique is to use google form. Questionnaire data is used to obtain responses about the needs of teaching books and resources used by students, as well as materials to know the materials required by students.

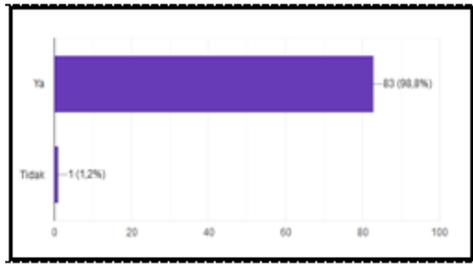
Qualitative descriptive analysis is used as an analysis technique with the type of content analysis or content analysis with the following steps: a) grouping the items on the sub-theme of the outer space explorers who are included in the cognitive domain of higher order thinking (HOTS), namely by grouping them based on levels C4, C5, C6; b) presenting qualitative descriptive data including the process of classifying, identifying, categorizing and drawing conclusions [15].

The results of this study use the research stage that only discusses the analysis of the needs of HOTS-based teaching books on mathematics learning courses. From this stage will be produced research on the development of the teaching book.

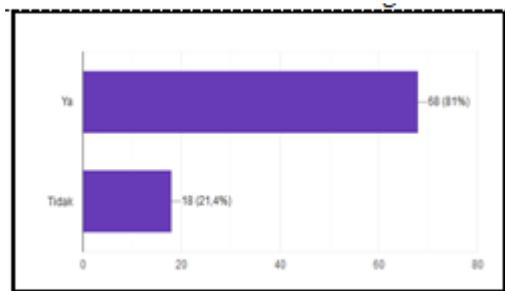
## **3. RESULT AND DISCUSSION**

### **3.1. Result**

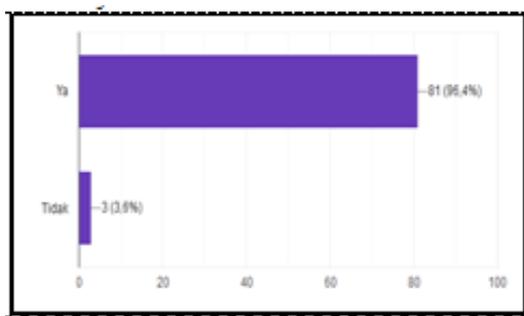
Based on the collection of questionnaire data related to the percentage of students stated that using other learning resources (internet, etc.), can be seen in figure 1. The percentage that suggested that students experienced the difficulty in understanding mathematics learning based on HOTS, in Figure 2 Students who state that they need HOTS-based teaching books on math learning courses in elementary school can be seen in Figure 1.



**Figure 1.** Percentage of students who use learning resources (internet, etc.) in math learning courses in elementary school



**Figure 2.** Percentage of students who have difficulty understanding HOTS-based math learning



**Figure 3.** Percentage of students who need HOTS-based teaching books in math learning courses in elementary school

**3.2. Discussion**

[16] the level of thinking of students actually has four levels, namely recall (memorization), basic (understanding), critic (critical), and creative (creative). The level of factual knowledge in the knowledge dimension does not include part of HOTS [17]. [18] To recognize the competence of students comprehensively, it is divided into low-level thinking skills (LOTS) and high-level thinking skills (HOTS). Based on the results of the research conducted, it shows that there are types of high-level items or HOTS in the student books on the sub-theme of space explorers. Based on the results of the analysis of the needs of students of elementary education study program Sriwijaya University can be identified students are in desperate need of the creation

and development of HOTS-based teaching books in mathematics learning lectures in elementary schools. From the results of the analysis is known that in the process of studying mathematics in elementary school, lecturers and students have not been supported with teaching books that can help students in learning and understanding the materials provided. [19] Teachers in schools make test questions not to measure students' thinking skills but merely measure the achievement of learning objectives. Thinking skills are divided into lower order thinking skills (LOTS) and higher order thinking skills (HOTS).

In accordance with following the implementation of curriculum 2013, where there is an understanding of HOTS in learning, the author will develop HOTS-based teaching books on mathematics learning courses in elementary school. The determination of title and content is adjusted based on the semester lecture plan (RPS). The discussion of materials such as number matter, fractional number, flat build, and measurement. The focus of material studies is low-grade math learning in elementary school.

Questionnaire data that has been disseminated obtained that 98.8% of students conduct math learning lectures using other sources such as reading or articles downloaded from the internet. However, the source does not make students understand or understand the expected material. Then also the source of the internet is not sure the truth. Regarding HOTS discussion, the need for a complete and clear explanation so that students can understand and can apply it in elementary school math learning.

Many sources from the internet can not ensure students to understand about HOTS, this is evidenced by the results of the questionnaire data that 81% of students still have difficulty in understanding HOTS-based math learning. [20] A HOTS test item is given through a stimulus. A stimulus can be derived from the recent global issues such as technology, information, science, education, health, and infra-structure. Based on the percentage resulting from the previous questionnaire data, students at the level need to have a HOTS-based teaching book as a handle on mathematics learning in elementary school, this is indicated by the percentage result that 96.4% of students need HOTS-based teaching books on math learning courses in elementary school. In environmental learning in schools there are not many who apply HOTS-based learning at school [21].

HOTS is divided into four groups, namely problem solving, decision making, critical thinking, and creative thinking [22]. From that understanding, it is considered important in understanding how HOTS is applied in mathematics learning. The four groups are difficult to distinguish from students if there are no specific guidelines or guidelines in the form of teaching books.

HOTS have a strong relationship with problem-solving; HOTS can be promoted if students are exposed to non-routine and open problems. This factor has caused a weak relationship between students' HOTS and inductive reasoning [23].

This is related to the globalization era will change the lifestyle of society from agrarian and traditional commerce to modern industrial and commercial society as seen in WTO, ASEAN Community, APEC, and AFTA. Future challenges are also linked to the shift of world economic power, the influence and impact of techno-sciences and the quality, investment, and transformation of education [24].

The selection of HOTS-based teaching books is an endorsement of the implementation of the 2013 curriculum that expects students to have a high level of thinking ability in each learning. It is also a supply of prospective teachers, especially in elementary school, expected to have the ability to provide mathematics learning in HOTS-based elementary schools. In the development of HOTS-based teaching books on mathematics learning courses in elementary school in the elementary education study program FKIP Unsri program, it will be more interesting and easy to understand for students. Teaching book writing orates on the systematic and structured transformation of knowledge. Teaching book formats include layout and systematic. Teaching books are part of the completeness or means of learning that has the mission of delivering materials following the curriculum and syllabus [25].

From the previous explanation, HOTS-based teaching books on mathematics learning courses in elementary school will be developed systematically and structured with curriculum adjustments i.e. material numbers number 10,000, with a discussion of the understanding of the number of numbers, the value of the place, the operation of the count and the nature of the operation. Then the fractional number material consists of the calculated operation and the properties of its operation. The follow-up material is the introduction of data wake which consists of a grouping of flat build shapes, binding, folding, and swivel symmetry. The last discussed material is about measurements consisting of the introduction of measurements of length, weight, time, and as well as angle and area. The material discussed will be designed in a book that is a HOTS-based teaching book, because all materials will be applied HOTS.

Zulkipli at al. [26] showed elementary school teachers better prepared in terms of knowledge, skills and attitudes toward the field of pedagogy but weak in thinking skills than secondary school teachers. If a teacher wants to become a professional teacher then he should always be able to improve his knowledge of academic and practical knowledge through tiered education or up-grading and / or in-service training with

his peers [27] Teacher's knowledge should be poured in careful, structured and systematic learning planning [28].

Training to implementation of curriculum that has been changes and is updated for teachers is a necessity, because the change and updating of documents such as the Curriculum 2013 requires a comprehensive understanding of curriculum implementing stakeholders, such as teachers, principals, supervisors, and education quality assurance in the field [29]. Problems HOTS is a problem that has been resolved not just using the formula directly, it raises its problems complex, has many solutions, requires interpretation and requires strenuous effort in hooking up to make decisions [30].

The findings of this article can be followed up by the author in developing the teaching book, to provide students with the need to study and delve into the material of mathematics learning in elementary school that is looking forward to being a prospective elementary school teacher will be able to implement it to students.

#### 4. CONCLUSION

Based on the results of the research conducted, it can be concluded that there are obstacles in the course of mathematics learning namely the unreading of teaching books that are used as a handle in learning, and the difficulty of students in understanding HOTS-based learning. The teaching book that needs to be developed on mathematics learning courses in elementary school is a HOTS-based teaching book. The teaching book developed is a math learning material in HOTS-based elementary school.

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#### REFERENCES

- [1] Sobri, M., et.al, Pembentukan karakter disiplin siswa melalui kultur sekolah, 2019, in: *Harmoni Sosial: Jurnal Pendidikan IPS*, 6(1). <https://doi.org/10.21831/hsjpi.v6i1.26912>
- [2] Fuaddilah and Agela, Implementasi HOTS Pada Pembelajaran Matematika Sd/Mi Kelas 6. *Jurnal Guru Kita*, Vol. 4 No. 1 Desember 2019, [jurnal.unimed.ac.id](http://jurnal.unimed.ac.id).
- [3] Dinni, Husna Nur, HOTS (High Order Thinking Skills) dan Kaitannya dengan Kemampuan Literasi Matematika. 2018. <https://journal.unnes.ac.id/sju>

- /index.php/prisma/. Diakses tanggal 28 Desember 2019
- [4] Widodo, et.al, Analisis Konten HOTS dalam Buku Siswa Kelas V Tema 6 “Panas dan Perpindahannya” Kurikulum 2013, 2019, in: *Jurnal Pendidikan dan Pembelajaran Dasar*. Vol. 12 No. 1 Desember 2019.
- [5] Kusuma, et.al, The Development of Higher Order Thinking Skill (HOTS) Instrument Assessment In Physics Study, 2017, in: *IOSR Journal of Research & Method in Education (IOSRJRME)*, pp: 26–32. DOI: <https://doi.org/10.9790/7388-0701052632>
- [6] Riadi, A, Problem Based Learning Meningkatkan Higher Order Thinking Skill Siswa kelas VIII SMPN 1 Daha Utara dan SMPN 2 Daha Utara., 2016, pp: 154-163, in: *Math Didactic: Jurnal Pendidikan Matematika*. Vol. 2 (3)
- [7] Indonesia PISA Center, Ranking Indonesia dalam PISARetrieved December 03, 2020, from [www.Indonesiapisacenter.com/2020](http://www.Indonesiapisacenter.com/2020)
- [8] Kemendikbud, Materi Sosialisasi Kurikulum 2013, Juli 2013
- [9] Oktaviani, N., M. and Wulandari I, Implementation of Standard of Graduate Competence in Curriculum 2013, in *Journal of Teaching and Learning in Elementary Education (JTLEE)*. Vol. 2 No. 2 August 2019. PP. 126. DOI: <http://dx.doi.org/10.33578/jtlee.v2i2.7719>
- [10] Maryani, A, Analisis Kemampuan Inovasi Pembelajaran Guru Sekolah Dasar Dalam Implementasi Pembelajaran Tematik Kurikulum 2013, in: *Journal Profesi Pendidikan Dasar*. Vol. 6, No. 2, Desember 2019. DOI: 10.23917/ppd.v1i2.9028
- [11] Retnawati H, et.al., Teachers Difficulties in Implementing Thematic Teaching and Learning in Elementary Schools, in: *The New Education Review* 48, 2017, pp. 201-212.
- [12] Yuliati, S.R. and Lestari, I, Higher-order thinking skills (HOTS) analysis of Students in solving HOTS question In higher education, pp. 185, in: *PERSPEKTIF Ilmu Pendidikan* - Vol. 32 No. 2 Oktober 2018. DOI: <https://doi.org/10.21009/PIP.322.10>.
- [13] Pratama, G.S. and Retnawati, H, Urgency of Higher Order Thinking Skills (HOTS) Content Analysis in Mathematics Textbook, in: *Journal of Physics: Conference Series* 1097 (2018) 012147. doi :10.1088/1742-6596/1097/1/012147.
- [14] Misrom, et.al, Enhancing Students’ Higher-Order Thinking Skills (HOTS) Through an Inductive Reasoning Strategy Using Geogebra, pp:156. in: *iJET– Vol. 15, No. 3, 2020*.
- [15] Najiroh, W. and Rokhimawan, M.A, Analisis soal HOTS pada buku siswa tokoh penjelajah, in: *Journal Profesi Pendidikan Dasar*, 2020, pp. 17. DOI: <https://doi.org/10.23917/ppd.v1i1.9652>
- [16] Hasyim, M., and Andreina, F.K, Analisis High Order Thinking Skill (HOTS) Siswa Dalam Menyelesaikan Soal Open Ended Matematika, 2019, pp. 56, in: *Jurnal Pendidikan Matematika dan Matematika (FIBONACCI)*. ISSN : 2460 – 7797, e-ISSN : 2614 – 8234.
- [17] Jailani, et. Al, Desain Pembelajaran Matematika untuk Melatihkan Higher Order Thinking Skills. Yogyakarta: UNY Press, 2018
- [18] Kurniati, D.,H.,R. and Asiyah, N, Kemampuan Berpikir Tingkat Tinggi Siswa SMP di Kabupaten Jember dalam Menyelesaikan Soal Berstandar PISA, in: *Jurnal Penelitian dan Evaluasi Pendidikan*, Vol.20 No.2, 2016, pp. 142-155.
- [19] Afnia, P., N., and Istiyono, E. The Development of Two-Tier Multiple Choice Instruments to Measure Higher Order Thinking Skills Bloomian, 2019, in: *3rd International Conference on Learning Innovation and Quality Education (ICLIQE)*
- [20] Hamdi, S., et al, Developing higher-order thinking skill (HOTS) test instrument using Lombok local cultures as contexts for junior secondary school mathematics, in: *REiD (Research and Evaluation in Education)*, 4(2), 2018, ISSN 2460.
- [21] Ichsan, I. Z., et.al, Students ’ Higher Order Thinking Skills in Environmental Learning : Develop Assessment Based on Green Consumerism,2019 in: *Journal of Educational Science and Technology (EST)*, 5(1), 9–19.
- [22] Yuniar, dkk, Analisis HOTS (High Order Thinking Skills) Pada Soal Objektif Tes dalam Mata Pelajaran Ilmu Pengetahuan Sosial (IPS) kelas V SD Negeri 7 Ciamis. 2015. <https://ejournal.upi.edu/index.php/pedadidaktika/article/viewFile/5845/3961>. Diakses tanggal 28 Desember 2019
- [23] Adri, N., et.al, Literatur study : The relationship of mathematics problem solving and students’ higher, , 2016, pp. 16-17.
- [24] Efendi, M.Y. and Lien, H.N, The Comparison of Curriculum in Elementary Education between Indonesia and Singapore, in: *Journal of Teaching and Learning in Elementary Education (JTLEE)*

Vol. 3, No. 2, February 2020. DOI:  
<http://dx.doi.org/10.33578/jtlee.v3i1.7323>

- [25] LKPP, Bahan Ajar, Buku Ajar, Modul, dan Panduan Praktik. Unhas: Makassar, 2015. <http://lkpp.unhas.ac.id/files/Format%20Buku%20Ajar.pdf>.
- [26] Zulkpli, et.al, Assessing mathematics teachers' knowledge in teaching thinking skills, in: *Sains Humanika*, 2017, pp: 83–87. DOI: <https://doi.org/10.11113/sh.v9n1-4.1129>
- [27] Uno, H.B, Profesi Kependidikan: Problema, Solusi, dan Reformasi Pendidikan di Indonesia. Jakarta: Bumi Akasara, 2009.
- [28] Kartika, D. R., & Pasandaran, R. F, Analisis Kemampuan Guru dalam Menanamkan Konsep Limit Fungsi. *Jurnal Pedagogy*, Vol.1 No. 2. , 2016 UNCP. In: <http://journal.uncp.ac.id/index.php/Pedagogy/article/view/356>.
- [29] Sutjipto, Pentingnya Pelatihan Kurikulum bagi Guru, in: *Jurnal Pendidikan dan Kebudayaan*, 1(26), 2016, pp. 235-260.
- [30] Pasandaran, R., F., and Kartika, D., M., R, Higher order thinking skill (HOTS): Pembelajaran matematika kontemporer, in: *Jurnal Pendidikan Matematika (PEDAGOGY)*, Vol 4, No. 1, 2019, pp. 53. DOI: <http://dx.doi.org/10.30605/pedagogy.v4i1.1429>