

Development of Mathematics Student Worksheets (LKPD) Based on Higher Order Thinking Skills (HOTS) to Build Space for Elementary School Students Subdistrict Montong Tuban Regency

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Abstract: The objectives of this study are 1) to analyze the needs of LKPD based on HOTS class VI students in the course of mathematics development Build Room; 2) to find out whether the HOTS-based LKPD design can make students think critically about the material for building a mathematics subject room for grade VI 3 students. To find out whether a HOTS-based LKPD is practical and effective, it can improve the learning outcomes of grade VI students in the meter of building a mathematics subject room. This research uses Research and Development (R&D) research with 4D models that have been developed by Tiagharajan Samuel the stages of 4D models are 1) Defining, 2) Design, 3) Development and 4) Disseminate. This research is only up to stage three, namely development (develop). The data analysis technique used is a difficult analysis obtained from interviews, observations, and expert validation. The results obtained from this study are that the quality of LKPD developed based on HOTS is needed by students, this can be observed from filling out the observation sheet for students' LKPD needs reaching 87.7% (urgently needed). In terms of design covering (cover design, basic competence, and indicator), objectives, material discussion, questions) to find out the average practicality test of X-gab in students was 4.6, in teachers 4.6 (very good), and the test for improving learning outcomes using the N-Gain formula from the two schools of Public Elementary School No. 2 Talangkembar and Public Elementary School No. 2 Tanggulangin obtained a score of 0.81 (high). From this description, it can be concluded that the development of HOTS-based LKPD in mathematics courses, this space-building material can encourage students to think more critically, the design is very practical so that it is effective to improve mathematics learning outcomes, and the material for building a classroom vi student's room is feasible and very good for use in learning activities in Elementary School No. class VI.

Keywords: Higher order thinking skills (HOTS), student worksheets (LKPD), 4D

1. Introduction

In the 2013 curriculum, learning is emphasized to be student centred. According to the Minister of Education and Culture Number 22 of 2016 regulates the standards of the primary and secondary education process. Process standards are criteria regarding the implementation of learning in educational units to achieve Graduate Competency Standards. Process Standards are developed referring to graduate competency standards and content standards that have been set following the provisions in Government Regulation Number 19 of 2005 concerning National Education Standards (Helda & Syahrani, 2022). The learning process in the education unit is held interactively, inspiringly, fun, challenging, motivating students to participate actively, and providing sufficient space for the initiative, creativity, and independence of the talents, interests, and physical and psychological development of students, in addition to that the media and supporting books or LKPD are also very necessary in encouraging the achievement of a learner in the classroom to improve better learning skills (Noprinda & Soleh, 2019). In the process of improving learning outcomes, there are many things that the government needs to pay attention to, one of which is the availability of learning manuals. Manuals are very important in learning because they are used as a reference for learning materials by students. The government itself has provided a manual that is following the 2013 curriculum and has been distributed to schools. However, because it is felt that the

books given are still lacking to support learning, especially in elementary schools in Montong district, Tuban Regency, especially in group II, teachers also need Student Worksheets (LKPD) for learning activities in the classroom. Student Worksheets (LKPD) are media used in learning to increase student activities during the teaching and learning process (Haqsari, 2014). Meanwhile, according to Firdaus & Wilujeng (2018), the student worksheet (LKPD) is one of the means for learning in learning activities that can be developed by teachers, with teachers as facilitators.

Based on the background that has been described above, the identification of problems that can be described is as follows 1) teachers still use simple package books from schools in the absence of HOTS learning, 2) teachers have not taken advantage of the development of LKPD Mathematics with the concept of HOTS for learning, 3) the application of learning materials only sourced from package books resulted in low learning outcomes for class VI at Public Elementary School No. 2 Talangkembar, Montong District, Tuban Regency.

1.1 Problem Statement

Based on the background of the problem, the identification of the problem, and the scope of the problem described above, the formulation of the problems raised in this study is as follows:

- a) What is the need for *HOTS-based* mathematics LKPD material to build a space to improve the learning outcomes of grade VI elementary school students in Montong Subdistrict cluster II?
- b) How can the design of the HOTS-based LKPD development improve the learning outcomes of mathematics students in the construction of classroom VI Elementary School in Montong Subdistrict cluster II?
- c) Can the practicality of the HOTS-based LKPD model improve the learning outcomes of grade VI elementary school students in Montong Subdistrict, group II?

1.2 Research Objectives

The objectives to be achieved by the research are:

- a) Analyzing the needs of HOTS-based LKPD for grade VI students in the course of mathematics, Build an Elementary School Room in Montong District, group II.
- b) To find out whether the HOTS-based LKPD design can improve the results of learning mathematics in the material for building a study mathematics subject room for grade VI elementary school students in Montong District, group II.
- c) To find out whether HOTS-based LKPD is practical to be able to improve the learning outcomes of grade VI elementary school students in Montong Subdistrict cluster II.

2. Literature Review

According to Rahayu (2018), a number of teaching innovations should be tailored to the relevant curricula and students' level of ability in order to help students meet their learning objectives and develop their competencies. The main reason teachers need pre-made teaching materials, according to Desyandri et al. (2019), is because of the literature's restrictions. However, creating teaching materials is actually a simple process. Student worksheets are the pre-made teaching materials that are used. According to Levine & White (2017), there is a very real risk associated with employing ready-to-use educational materials if they are not relevant to the student's needs, boring, engaging, or monotonous. Many educational institutions acquire the following as instructional materials: worksheets for students also referred to as LKPD. The used worksheets for students are ready-to-use worksheets with learning resources and exercises.

Actually, learning resources are not limited to books alone and can also come from other sources such as newspapers, short stories, the internet, people, and the natural world (Lau et al., 2018). Therefore, it is intended that students' knowledge extends beyond the pages of books. In this situation, the teacher's function is largely assumed. Teachers must explore additional resources that can aid in learning.

Teachers must be competent to implement learning in accordance with the relevant curriculum in light of curricular changes. As a result, having educational tools that actively grow kids is essential. Student worksheets (LKPD) are a way to support and enable teaching and learning activities so that students and teachers can interact effectively, which can boost learning activities and student accomplishments (Widodo, 2017). The advantages of LKPD include engaging students in the learning process, assisting in the development of concepts, teaching them how to locate and develop process skills, and serving as a guide for educators and students in carrying out the mathematics learning process. The mathematical approach plays a significant role in aiding students in developing their mathematical knowledge and in effectively expressing a variety of ideas. clearly, and hone their interpersonal abilities (Harun et al., 2021).

Higher order thinking skills (HOTS) is an effective approach for learning mathematics because it encourages the development of sophisticated thought processes and the processing of logic in a setting that is purposefully created by the teacher using a variety of techniques, allowing the mathematics learning programme to grow and develop optimally and enable learning activities to be carried out effectively and efficiently (Baharin, Kamarudin, & Manaf, 2018; Pratama & Retnawati, 2018).

The models, techniques, and learning mediums that are employed are all essential to the success of learning. The usage of Student Worksheet (LKPD) media has an impact on how well students learn; if LKPD is used effectively,

learning objectives will be met as well. According to Wahyuningsih, Saputro, and Mulyani (2014), the majority of the LKPD now in circulation do not adhere to the applicable curriculum, and the LKPD's content does not adhere to the 2013 curriculum's rules either. The 5M process, which includes watching, inquiring about things, obtaining information, forming associations, and communicating, is given priority in the 2013 curriculum (Puspitadewi, Fitrihidajati, & Prastiwi, 2014).

LKPD is a collection of sheets containing student activities that allow students to carry out real activities with the objects and problems studied. LKPD serves as a learning guide for students and also makes it easier for students and teachers to carry out teaching and learning activities. LKPD can also be defined as printed teaching material in the form of sheets of paper containing material, summaries, and instructions for the implementation of tasks that must be done by students, which refers to the basic competencies achieved (Pratama & Saregar, 2019).

Student worksheets (LKPD) are a way to support and enable teaching and learning activities so that students and teachers may interact more effectively, which can boost learning activities and student accomplishments. LKPD materials in the form of sheets of paper containing information, summaries, and directions for tasks that students must complete are also referred to as LKPD, and they refer to the fundamental competencies attained (Izzatunnisa, Andayani, & Hakim, 2019). Student worksheets (LKPD) are a way to support and enable teaching and learning activities so that students and teachers may interact more effectively, which can boost learning activities and student accomplishments. There are six primary components of LKPD, including 1) The title, 2) the lesson's guidelines, 3) fundamental expertise or subject matter, 4) complementary data, 5) tasks or job phases, and 6) assessment (Mandasari, Arnawa, & Atmazaki, 2018).

3. Methodology

The product developed is a Student Worksheet (LKPD) mathematics material to build space by using a research and development theory approach method called Research and Development (R&D). This study uses the 3D model, namely 1) pen definition, 2) design, and 3) development. Data collection of this study was carried out using technique interview, expert validation, and observation.

4. Results and Discussion

The results of data collection that have been obtained in this study will be analyzed according to the analysis of predetermined data. The representation of the results of data analysis is proof of how the needs, development design, and practicality of HOTS-based LKPD can improve the learning outcomes of grade IV elementary school students.

4.1 LKPD Needs Analysis







Needs Analysis the results of the needs analysis based on the results of filling out the student questionnaire showed the results that the need for HOTS-based LKPD in mathematics subjects, the learning outcomes room building material was considered quite high. The average answer to the observation results of student needs at Public Elementary School No. 2 Tanggulangin and Public Elementary School No. 2 Talangkembar was 90.8%. As well as the results of teacher observations. The average answer to the results of filling out the teacher needs questionnaire was 93%. This indicates that students and teachers are in dire need of learning LKPD to be used in improving student outcomes. This is reinforced by the opinion (Sugiyono 2017) which states that R&D development research is a basic research activity to obtain information on user needs, then continued with development to produce products and assess the effectiveness of the product.

4.2 LKPD Development Design

This HOTS-based LKPD was developed to make it easier for students to learn mathematics learning on the theme of building space. Where in the LKPD design, the researcher hopes to become a practical LKPD to encourage the progress of learning so that before the trial in the class the researcher submits to the validator to be validated.

The development of designs and questions can be seen from the results of the average validation proposed. Two validators on average reached 4.27, where validator 1 gave a score of 4.19 and validator 2 gave a score of 4.34 so from the average results of the HOTS-based LKPD Design validators in Mathematics subjects the material of building space was categorized as good so the design of the developer can be categorized as feasible for use.

Table 1. Sample contents of LKPD

| The question form is not LOTS | Form of HOTS questions |
|---|---|
| <p>1. Waking up besides having..... side.... ribs.... point corner.</p>  | <p>1. If Mr. Taji has two cubes and 1 block with a stacked position how many sides.....ribs.....corner point... that is visible and countable.</p> <p>2. If 1 cube and 1 block are stacked into one how many sides are seen and we can count....</p> <p>3. Name an object in school that resembles the shape of a space....</p> |
| <p>2. What is the number of sides on 2 cubes.</p> <p>3. The object besides its shape resembles.</p>  |  |
| <p>4. How many arrangements of objects resemble the cube below.</p>  | <p>4. How many cube arrangements are there in the picture above.</p>  |
| <p>5. Shaped like a wake-up to the above object....</p>  | <p>5. The picture besides is composed of a flat wake what is it? and how many flat many are attached to the object....</p> |

4.3 LKPD Practicality Test

Interview responses and practicality validation sheets that have been compiled by researchers and given to class VI students who have participated in the study and representatives of class VI teachers from both schools have a fairly good impact and at the same time can be stated in the calculation of referring on the observation table developed by Sugiyono (2011) at Public Elementary School No. 2 Talangkembar as the gain reached 510 and at Public Elementary School No. 2 Tanggulangin obtained a score of 390. Then, the average of class two the maximum is 23 while the maximum score is 25, the score obtained can be applied to the X-combined theory developed by Sugiyono (2017) then the X-combined of 39 students obtained a score of 4.6 and the average X-gab from 2 teachers also obtained 4.6. where the interval $(4 < \bar{X} \leq 5)$ category (excellent.) then it can be concluded that student responses based on observation sheets that HOTS-based LKPD in mathematics subjects with the theme of building space can be categorized as very practical and worthy of use for learning.

4.4 Analysis of Student Learning Outcomes

Analysis of learning outcomes can be seen from the acquisition of pretest scores (tests before carrying out learning using LKPD) where the average score from the two schools is very low, the next stage is carried out learning using HOTS-based LKPD which is carried out twice, namely stage 1) and stage 2) with predetermined learning steps, the next stage is obtained, namely looking at the score obtained by the average N-Gain. Public Elementary School No. 2 Talangkembar II with many students 22 obtained an average pretest of 55 highest scores of 70 and posttest 93 with the highest scores of 100 and an average of N-Gain of 0.82. Meanwhile, at Public Elementary School No. 2 Tanggulangin, many 17 students obtained an average score of 53 pretests and the highest 70 scores of posts 92 the highest score of 100 and an average N-Gain of 0.81.so that the HOTS-based LKPD Theme of building a room can improve the learning outcomes of Class VI Elementary school students in Cluster II, Montong District, Tuban Regency.

5. Conclusion

Based on the discussion in the research that has been carried out, the following conclusions were obtained it can be concluded that it is very necessary for a HOTS-based LKPD to improve the results of mathematics material for building a class VI student room. After going through a series of development persistence processes starting from the planning stage, and developing validation tests by validators to become a hots-based LKPD, it can be concluded that this LKPD design has the advantage of discussing material and questions that are clear, detailed and interesting for students to learn

so that it can encourage students to think more critically which can improve the results of students learning of grade VI Primary School.

Through the design of LKPD which is more random and practical, it is booked with the test of the practicality of observation techniques by teachers and students as well as the analysis of learning outcomes, this LKPD can be said to be practical and very effectively used for learning activities so that it can convey the results of learning mathematics material for building classroom VI.

Based on findings, the suggestions that need to be considered to improve the quality of learning with HOTS-based LKPD are as follows: 1) as an educated person, you must have the willingness to always innovate in developing various other learning device innovations that are more innovative, feasible and effective to increase new advantages, 2) teachers must be more active and professional in improving learning activities related to the development of LKPD to train students to be accustomed to thinking Higher Order Thinking Skills to create superior human resources, and 3) school institutions must always play an active role and facilitate through cluster activities or teacher working group to always develop learning tools for progress national education.

Become a scientific information material for practitioner educators regarding the development of HOTS-based LKPD with the hope that: As a motivation in developing effective learning innovations, it can be used as teaching material that can support the improvement of the quality of national education. The practical benefits obtained from the results of this research thesis include 1) as a material of literature in providing an optimal rationale for the proper advancement of education in institutions/schools, 2) as the teaching materials obtained are used to improve student learning outcomes in order to improve more in-depth learning outcomes, 3) hopefully the development of LKPD Based on Higher Order Thinking Skills (HOTS) can improve student learning outcomes so that learning outcomes from students can improve, and 4) increase knowledge and insight into appropriate learning support media to foster learning development that has detailed and in-depth concepts.

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