

The use of LKPD in terms of Students' Confidence Level in Solving HOTS Questions in Class X

I Made Surat^{1*}, I Komang Sukendra², I Dewa Putu Juwana³ 

^{1,2,3} Pendidikan Matematika, Universitas PGRI Mahadewa Indonesia, Bali, Indonesia

ARTICLE INFO

Article history:

Received March 07, 2023

Accepted June 09, 2023

Available online July 25, 2023

Kata Kunci:

LKPD, Percaya Diri, Soal HOTS

Keywords:

LKPD, Confidence, HOTS Questions



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ABSTRAK

Rendahnya kemampuan siswa dalam menyelesaikan soal-soal HOTS disebabkan karena kurangnya kepercayaan diri, serta latihan-latihan yang diberikan oleh guru, sehingga dalam proses pembelajaran siswa membutuhkan media yang dapat membantu proses belajarnya. Adapun tujuan dari penelitian ini adalah untuk menganalisis apakah metode LKPD berkelompok lebih efektif daripada metode LKPD Individual dalam menyelesaikan soal dan apakah terdapat interaksi antara metode dan tingkat percaya diri peserta didik dalam menyelesaikan soal HOTS pada peserta didik. Jenis penelitian ini adalah penelitian eksperimen dengan menggunakan desain faktorial treatment by level 3x2. Populasi penelitian ini adalah seluruh peserta didik kelas X yang berjumlah 420 anak. Penarikan sampel dalam penelitian dilakukan dengan menggunakan teknik sampling bertahap ganda. Tahap pertama adalah memilih sebanyak 3 kelas dari 10 kelas yang ada, kemudian menentukan kelas yang akan diberikan perlakuan metode A1, A2, dan A3. Pengumpulan data dalam penelitian dilakukan menggunakan metode tes, dengan instrument penelitian berupa tes dengan soal-soal HOTS. Data yang diperoleh kemudian dianalisis menggunakan analisis deskriptif dan anava factorial. Semua analisis tersebut menggunakan bantuan program SPSS versi 22. Hasil analisis menunjukkan bahwa terdapat perbedaan yang sangat signifikan antara rata-rata kelompok LKPD kelompok dengan kelompok LKPD Individu, serta antara LKPD individu dengan Konvensional. Berdasarkan hasil tersebut maka dapat disimpulkan bahwa penggunaan LKPD yang disertai dengan tingginya tingkat percaya diri siswa, secara efektif mampu meningkatkan kemampuan siswa dalam menyelesaikan soal-soal HOTS.

ABSTRACT

The low ability of students to solve HOTS questions is caused by a lack of self-confidence as well as exercises provided by the teacher, so in the learning process, students need media that can help their learning process. The purpose of this study was to analyze whether the group worksheet method was more effective than the individual worksheet method in solving questions and whether there was an interaction between the method and students' level of confidence in solving HOTS questions. This type of research is experimental research using a factorial treatment design at level 3x2. The population of this study was all students in class X, totaling 420 children. Sampling in the study was carried out using a double-stage sampling technique. The first stage is to select as many as 3 classes out of 10 existing classes, then determine which classes will be given the treatment of methods A1, A2, and A3. Data collection in the study was carried out using the test method, with the research instrument being a test with HOTS questions. The data obtained were then analyzed using descriptive analysis and factorial analysis. All of these analyses used the SPSS version 22 program. The results of the analysis show that there is a very significant difference between the average group LKPD group and the individual LKPD group, as well as between individual and conventional LKPD groups. Based on these results, it can be concluded that the use of LKPD accompanied by a high level of student confidence can effectively improve students' ability to solve HOTS questions.

1. INTRODUCTION

Critical thinking is an individual's ability to analyze, create, and use criteria objectively and evaluate data (Komariyah & Laili, 2018; Wicaksono & Prihatnani, 2019). Furthermore, it is explained that mathematical critical thinking is the ability to solve problems, analyze, evaluate, and compare with good reasons to make the best decisions in solving mathematical problems (Benyamin et al., 2021; Manalu & Siregar, 2019). Critical and creative thinking patterns can be achieved when an individual has high-level thinking skills, often referred to as Higher Order Thinking Skills (HOTS). In the process of implementing learning, learners at all levels of education need to be equipped with HOTS to prepare themselves for various challenges in the 21st century, allowing them to improve their survival skills in the 21st century. HOTS questions are measurement instruments used to assess high-level thinking skills, which involve thinking that goes beyond memorization, restating, or reciting without processing (Ismafitri et al., 2022; Ma'ruf et al., 2019; Mandini & Hartono, 2018). The main goal of HOTS questions is to improve students' higher-level thinking skills, especially those related to critical thinking skills in accepting various types of information, creative thinking in solving problems using existing knowledge, and making decisions in complex situations (Ismafitri et al., 2022; Masruroh et al., 2022; Purwaningsih, 2022). HOTS also requires students to critically evaluate information, draw conclusions, and make generalizations (Vania et al., 2022).

One of the factors that can maximize students' abilities when working on HOTS questions is their level of self-confidence. This is because self-confidence is an attitude or feeling of confidence in one's abilities, allowing individuals to act without excessive anxiety, feel free to do things they like, and take responsibility for their actions (Rohmat & Lestari, 2019; Wibawati & Watini, 2022). Furthermore, self-confidence is defined as confidence in one's ability to mobilize motivation and all necessary resources and apply them in actions that are appropriate for the tasks at hand (Sandra & Werdiningsih, 2020; Wicaksono & Prihatnani, 2019). Individuals with high self-confidence achieve good performance because they always think positively and believe in their own abilities (Darusman, 2023; Sabar et al., 2022). However, the reality in the field shows that students are often unable to demonstrate their academic achievements optimally according to their abilities. One of the reasons is that they often lack confidence in their ability to complete assigned tasks (Sabar et al., 2022). This, in turn, affects their ability to answer HOTS questions given by teachers. Observations and interviews conducted with mathematics teachers at SMA Negeri 7 Denpasar indicate that students are not yet able to formulate problems effectively when working on HOTS-based questions.

The low ability of students to answer HOTS questions is not only due to low self-confidence but also due to the lack of practice provided by teachers. If this continues, it will undoubtedly impact the students' critical thinking abilities. One effort that can be made is to provide practice questions through Group-based Student Worksheets (LKPD) based on HOTS questions. LKPD, as a teacher's tool, has characteristics that are systematic and organized, making students more active in learning, increasing students' writing interest, and building solidarity in group learning (Mursalim & Rumberak, 2021; Salwan & Rahmatan, 2018). LKPD is essentially a sheet that contains activities to stimulate students' curiosity, high-level thinking abilities, and skills (Nadifatinisa & Sari, 2021; Siahaan et al., 2022). A well-designed LKPD must follow the rules of writing and include relevant questions that can motivate students to learn. Additionally, the designed LKPD must also follow the conditions present in the activities (Nadifatinisa & Sari, 2021; Siahaan et al., 2022). LKPD used in the learning process aims to increase the activeness of participants and can be used to optimize participants' understanding of concepts, develop participants' skills, and serve as a guide in learning activities, helping participants apply the concepts they have learned (Eliati, 2020; Masruroh et al., 2022).

Learning tools in the form of LKPD are very helpful and facilitate the learning process, making it more effective for both participants and teachers and improving participants' learning activities and achievements (Nadifatinisa & Sari, 2021). Some previous studies have shown that problem-solving-oriented HOTS-based e-LKPD is effective for learning and significantly contributes to improving students' learning outcomes and critical thinking skills (Masruroh et al., 2022). Other research results indicate that interactive e-LKPD based on Balinese ethnic mathematics on flat geometry material for fourth-grade elementary school students is suitable for use and can improve students' mathematics learning outcomes (Mahendri & Agustika, 2022). Further research results reveal that there is an influence of student worksheets (LKPD) on the learning outcomes of fourth-grade elementary school students (Mursalim & Rumberak, 2021). Based on these research findings, it can be said that LKPD has a positive impact on improving the thinking abilities and learning outcomes of students. However, in previous research, there has been no specific study focusing on the use of LKPD in terms of students' confidence levels in answering HOTS questions in the tenth grade. Therefore, this study focuses on this aspect with the aim of analyzing whether group-based LKPD is more effective than individual LKPD in answering HOTS

questions and whether there is an interaction between the method and students' confidence levels in answering HOTS questions.

2. METHOD

This research belongs to the experimental research type, using a 3x2 factorial treatment by level design. The ANOVA model used is $X_{ijk} = \mu + \alpha_i + \beta_j + [\alpha\beta]_{ij} + \varepsilon_{ijk}$. In the linear model above, X represents the ability to solve HOTS questions, and X_{ijk} is the observation on the k -th subject under the combination of treatment effects of factors $abij$, with $i = 1,2,3$ and $j = 1,2$. The component μ is the overall mean (grand mean), α_i = the effect of factor A at the i -th level on X , β_j = the effect of factor B at the j -th level on X , $[\alpha\beta]_{ij}$ = the combination of interaction effects between A and B on X , and ε_{ijk} = the error factor on X_{ijk} . The population in this study consists of all tenth-grade students at SMAN 7 Denpasar, totaling 10 classes with a total of 420 students. The sampling technique used is a multi-stage random sampling technique. The first stage is to select 3 out of the 10 available classes. The next stage is to determine the classes that will be subjected to the A1, A2, and A3 method treatments. Before conducting the experiment, the three groups were compared using a one-way ANOVA. The data analyzed are mid-semester block test scores, which are meant to ensure equivalence between groups before the experiment is conducted.

The data obtained in this study were then analyzed using descriptive analysis and factorial ANOVA. If the test results are significant, further post-hoc tests are conducted. A descriptive analysis is performed to get an initial overview of the ability to solve HOTS questions in each group. Descriptive analysis includes minimum scores, maximum scores, modes, means, standard deviations, and skewness. Before using ANOVA for hypothesis testing, the assumptions of normality and homogeneity of variances must be met. The Lilliefors test is used for normality testing, and the Levene test is used to test homogeneity of variances. All of these analyses were performed using SPSS software version 22.

3. RESULT AND DISCUSSION

Result

The research analysis begins by conducting descriptive statistical tests on students' abilities to solve HOTS questions. The results of the descriptive statistical test for the scores of students' abilities to solve HOTS questions in the three groups can be seen in [Table 1](#).

Table 1. Descriptive Statistics of Higher Order Thinking Skills (HOTS) Scores in Each Group

Kls	Min	Maks	Median	Varians	SD	Skewness	Kurtosis
Group LKPD	55	82	73.0	55.9	7.5	-0.379	-0.690
Ind. LKPD	50	82	66.0	70.86	8.4	0.137	-0.754
Conv	42	83	60.0	111.87	10.6	0.213	-0.629

The results of the assumption tests for normal distribution and homogeneity of variances between groups, as prerequisites for ANOVA, are presented in [Table 2](#).

Table 2. Results of the Normality Test

Teaching Method	Kolmogorov-Smirnov			Shapiro-Wilk			
	Statistic	df	Sig.	Statistic	df	Sig.	
Score	Group LKPD (a1)	0.134	40	0.067	0.954	40	0.105
Solving HOTS	Individu LKPD (a2)	0.125	40	0.115	0.969	40	0.345
Questions	Conventional (a3)	0.101	40	0.200	0.970	40	0.355

The data in [Table 2](#) indicate that for all three groups of the teaching methods a1, a2, and a3, the probability value (Sig.) from the Kolmogorov-Smirnov test is > 0.05 . This means that the null hypothesis (H_0) stating that the samples come from a normally distributed population is accepted. Therefore, the assumption of normality is met. Regarding the homogeneity of variances, the test results for all three groups show homogeneity (Sig. $0.354 > 0.05$). The next analysis is a 3 x 2 factorial analysis, which can be seen in [Table 3](#).

Table 3. Summary of the 3x2 Factorial ANOVA

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Model	520611.488 ^a	6	86768.581	1268.561	0.000
Method	2576.648	2	1288.324	18.835	0.000
PD	956.991	1	956.991	13.991	0.000
Method * PD	547.046	2	273.523	3.999	0.021
Error	7797.512	114	68.399		
Total	528409.000	120			

Furthermore, the results of the ANOVA analysis for high and low levels can be seen in [Tables 4](#) and 5.

Table 4. Results of ANOVA Analysis at High Level (b1)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	360.698	2	180.349	2.466	0.094
Within Groups	3948.811	54	73.126		
Total	4309.509	56			

Table 5. Results of ANOVA Analysis at Low Level (b2)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2878.728	2	1439.364	22.439	0.000
Within Groups	3848.700	60	64.145		
Total	6727.429	62			

The data in [Table 4](#) shows that the F-value = 2.466 is not significant because the p-value (sig.) = 0.094 > 0.05. This means that the differences in the means of the three groups at the high confidence level do not truly exist in the population. However, the data in [Table 5](#) shows that the F-value + 22.439 is highly significant because the p-value (Sig.) = 0.000 ... < 0.05. This means that at a low confidence level, the application of the LKPD method has a significant effect. The obtained data was then reanalyzed through the LSD test by Duncan, as shown in [Table 6](#).

Table 6. Results of the LSD Test by Duncan

(I) Method at the Low Level	(J) Method at the Low Level	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Group LKPD	Individu LKPD	6.874	2.443	0.007	1.987	11.762
	Conventional					
Ind. LKPD	Group LKPD	16.536	2.474	0.000	11.587	21.486
	Conventional					
Conventional	Group LKPD	-6.874	2.443	0.007	-11.762	-1.987
	Individu LKPD	9.662	2.502	0.000	4.656	14.667
	Group LKPD	-16.536	2.474	0.000	-21.486	-11.587
	Individu LKPD	-9.662	2.502	0.000	-14.667	-4.656

The null hypotheses formulated are as follows: H01: $\alpha_i=0$, for all prices i, against the alternative hypothesis H11: $\alpha_i \neq 0$, for at least one price i. H02: $\beta_j=0$, for all prices j, H12: $\beta_j \neq 0$, for at least one price j. Also, H03: $\alpha\beta_{ij}=0$ against H13: $\alpha\beta_{ij} \neq 0$, for at least one price i and j. If confirmed with [Table 4](#), it appears that all three show significant results because the probability (Sig.) < 0.05. Therefore, all three null hypotheses are rejected, and their alternative hypotheses are accepted. This means that there is a significant difference in the influence of using Group LKPD (a1), Individual LKPD (a2), and Conventional (a3) methods on the ability to solve HOTS questions. Furthermore, there is an interaction effect between the use of methods and the level of confidence at the 5% significance level. The next step is to perform a difference test between the means of the three experimental groups. Since the above ANOVA test only shows that there is a difference among the a1, a2, and a3 groups, it is not known which groups are different. To test which pairs are different, the LSD (Least Significant Difference) post-hoc test is

performed. From Table 6, it can be seen that there is a highly significant difference between the mean scores of the Group LKPD and Individual LKPD, with a value of 6.874 at a significance level of $0.007 < 1\%$. Similarly, there is a significant difference between Group LKPD and Conventional with a value of 16.538 at a significance level of $0.000... < 1\%$. Furthermore, the difference in mean scores between Individual LKPD and conventional LKPD is 9.162 with a significance level of $0.000... < 1\%$. With these results, it can be said that the application of the Group LKPD method at the low confidence level is the most effective among the three groups. Similarly, the use of the Individual LKPD method is more effective than the conventional method at a low confidence level, but at a high confidence level, the use of all three methods does not differ significantly.

Discussion

Based on the data analysis conducted, it can be observed that self-confidence is the most influential factor affecting students' ability to solve HOTS (Higher Order Thinking Skills) questions. Therefore, teachers are required to provide positive encouragement throughout the learning process. Self-confidence is fundamentally an attitude or feeling of self-assuredness in one's abilities, allowing the individual to perform actions without excessive anxiety, feel free to engage in activities they enjoy, and take responsibility for their actions (Andriyani et al., 2023; Martono et al., 2021). Furthermore, self-confidence is also defined as an individual's belief in their ability to mobilize motivation and all required resources, manifesting them in actions that align with task demands (Sandra & Werdiningsih, 2020; Wicaksono & Prihatnani, 2019). Individuals with high self-confidence tend to achieve good results because they maintain a positive outlook and trust in their abilities, thereby instilling confidence in the quality of their work (Darusman, 2023; Sabar et al., 2022).

The self-confidence displayed by students can enhance their ability to solve HOTS questions presented in Learning Implementation Tools (LKPD). HOTS questions require higher-order thinking skills and critical thinking abilities from students. Students with good self-confidence will confidently tackle such questions without doubt or fear of making mistakes (Soleha et al., 2021; Ulum et al., 2019). Developing critical thinking skills through the provision of HOTS questions is essential to preparing students to face the challenges of the 21st century (Benyamin et al., 2021; Manalu & Siregar, 2019). HOTS questions can be used as measurement instruments to assess higher-order thinking skills, which involve thinking beyond mere recall, restatement, or recitation without processing (Ismafitri et al., 2022; Ma'ruf et al., 2019; Mandini & Hartono, 2018). HOTS questions presented in LKPD make it easier for students to learn because LKPD provides systematic practice questions along with their solutions (Vania et al., 2022).

During the learning process, LKPD serves the purpose of enhancing students' engagement, optimizing their understanding of concepts, honing their skills, and providing guidance in learning activities while helping students apply discovered concepts (Siahaan et al., 2022). The results obtained in this study are consistent with previous research, which also found that e-LKPD (Electronic Learning Implementation Tools) based on problem-solving oriented towards HOTS is effective in learning and significantly contributes to improving students' learning outcomes and critical thinking skills (Masrurroh et al., 2022). Other research outcomes have shown that interactive e-LKPD based on Balinese ethnomathematics in plane geometry for fourth-grade elementary students is suitable for use and enhances students' math learning outcomes (Mahendri & Agustika, 2022). Further research results indicate that there is an influence of the Student Worksheet (LKPD) on the learning outcomes of fourth-grade elementary students (Mursalim & Rumberak, 2021). Therefore, based on these various research findings, it can be concluded that LKPD has a positive impact on improving thinking abilities and enhancing students' learning outcomes.

4. CONCLUSION

Based on the analysis and discussion, it can be concluded that the use of LKPD, combined with a high level of student self-confidence, effectively enhances students' abilities to solve HOTS questions.

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