THE IMPLEMENTATION OF STUDENT WORKSHEET BASED ON PROBLEM BASED LEARNING ON ENVIRONMENTAL CHANGES TO TRAIN CRITICAL THINKING SKILL FOR STUDENTS OF GRADE X SENIOR HIGH SCHOOL

Penerapan Lembar Kerja Peserta Didik Berbasis Problem Based Learning Materi Perubahan Lingkungan Untuk Melatihkan Keterampilan Berpikir Kritis Peserta Didik Kelas X SMA

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Abstract

One of the characteristics of the Independent Curriculum listed in the Pancasila Student Profile dimension is critical reasoning. This is in line with the demands of 21st-century skills, namely critical thinking. The implementation of the Independent Learning Curriculum emphasizes the selection of learning models. One of the learning alternatives that can be implemented is learning that applies LKPD based on Problem Based Learning (PBL) to train students' critical thinking skills in class X environmental change materials adapted from the LKPD developed by Afkarina (2023). The objective of this study is to describe 1) the implementation of learning, 2) students' critical thinking skills, and 3) students' responses. This research includes a type of application research with a Pre-experimental design, the research target is 98 students in class X of SMAN 1 Pesanggaran, Banyuwangi. The parameters measured were 1) the implementation of learning, 2) students' critical thinking skills, and 3) students' responses. Research instrument was obtained from validation, critical thinking skills observation sheet, questionnaire and test sheets. The data from the research results were analyzed using a quantitative descriptive analysis method. The results of the study showed that 1) the implementation of learning carried out by teachers was very good with a score of 99.44%, 2) 95.19% of students had carried out critical thinking skills very well and achieved the completeness of indicators, 3) the response of students to LKPD was 95.69% or very positive.
Keywords: the implementation of student woorsheets based on problem based learning, critical thinking skills, environmental change material.

Abstrak

Salah satu karakteristik dalam Kurikulum Merdeka yang tercantum dalam dimensi Profil Pelajar Pancasila adalah bernalar kritis. Hal ini selaras dengan tuntutan keterampilan abad ke-21 yaitu berpikir kritis. Implementasi Kurikulum Merdeka Belajar menekankan pada pemilihan model pembelajaran. Salah satu alternatif pembelajaran yang dapat diimplementasikan yaitu pembelajaran yang menerapkan LKPD berbasis Problem Based Learning (PBL) untuk melatihkan keterampilan berpikir kritis peserta didik pada materi perubahan lingkungan kelas X yang diadaptasi dari LKPD yang dikembangkan Afkarina (2023). Tujuan penelitian ini untuk mendeskripsikan 1) keterlaksanaan pembelajaran, 2) keterampilan berpikir kritis peserta didik, dan 3) respon peserta didik. Penelitian ini termasuk jenis penelitian penerapan dengan desain Pre-eksperimental, sasaran penelitian 98 siswa kelas X SMAN 1 Pesanggaran, Banyuwangi. Parameter yang diukur yaitu 1) keterlaksanaan pembelajaran, 2) keterampilan berpikir kritis peserta didik, dan 3) respon peserta didik. Intrumen penelitian ini diperoleh dari lembar keterlaksanaan, lembar observasi keterampilan berpikir kritis, lembar angket, dan lembar tes. Data hasil penelitiannya dianalisis mempergunakan metode analisis deskriptif kuantitatif. Hasil penelitian menunjukkan 1) keterlaksanaan pembelajaran yang dilaksanakan oleh guru sangat baik dengan skor 99,44%, 2) 95,19% peserta didik sudah menjalankan keterampilan berpikir kritis dengan sangat baik dan mencapai ketuntasan indikator, 3) respon peserta didik terhadap LKPD sebesar 95.69% atau sangat positif.
Kata kunci: *penerapan lembar kegiatan siswa berbasis problem based learning, keterampilan berpikir kritis, materi perubahan lingkungan.*

INTRODUCTION

Referring to the Decree of the Minister of Education and Culture, Research and Technology Number 56 of 2022 concerning Guidelines for Implementation Curriculum in the Context of Learning Recovery (Curriculum Merdeka), refers to the government's efforts to overcome learning loss by designing an independent curriculum as an effort to improve the curriculum previously applied (Kemendikbud, 2022). One of the characteristics in the Independent Curriculum listed in the dimensions of the Pancasila Student Profile is critical reasoning. This meets the demands of 21st century skills, namely 4C which consists of (1) Critical Thinking; (2) Creative Thinking; (3) Collaboration; and (4) Communication. One of the important skills in 4C is critical thinking because these skills are needed by students (Siswati et al., 2020).

Critical thinking is thinking that has the purpose of interpreting, solving problems and proving something (Facione, 2015). The ability to think critically is not just about receiving information simply, but also analyzing the information received and involving an active thinking process (Khasanah and Listiawan, 2017). Facione (2015) states that students are said to have critical thinking skills if they have met six indicators, including interpretation, analysis, evaluation, inference, explanation and self-regulation. The implementation of the Merdeka Belajar Curriculum prioritizes the selection of learning models. Critical thinking skills can be trained in students by using the Problem Based Learning (PBL) learning model because PBL syntax can stimulate critical thinking skills. A good learning model is one that contains contextual problems and examples (Islahiyah et al., 2021).

Problem Based Learning (PBL) is a learning process that presents a problem to students in groups in solving problems so that there is an interaction between stimulus and response (Widiasworo, 2018). The PBL model presents real problems to students as a stimulus at the beginning of the learning process then guided by teachers to solve problems by means of investigation and application as an effort to approach problem solving (Riyanto, 2024). Learning that can train students to build concepts based on contextual problems is PBL because in the syntax PBL can train students' critical thinking skills. The PBL approach has five stages; first is the orientation of learners towards problems, second organizes learners to learn, third guides individual or group investigation, fourth develops and presents work and analyzes and fifth evaluates the problem-solving process (Arends, 2012). The characteristics of the PBL

learning model can be appropriate if applied during the class X biology learning process, namely in phase E.

According to the Ministry of Education and Culture (2022), the demands for independent curriculum biology learning outcomes at phase E is that "students have the ability to create solutions to problems based on local, national or global problems related to environmental change". However, facts in the field show that students in Indonesia have low critical thinking skills, as evidenced by Ma'rufah and Wisanti (2023) research at SMA Labschool Unesa class X showing that there are 56 students who have critical thinking skills in interpretation indicators, analysis indicators and explanation indicators respectively getting percentages of 54.13%, 30.36% and 36.91% with very low categories. One of the causes of low critical thinking skills is learning that is less effective in increasing the talents, potential, and interests of students (Anisa et al., 2021).

The PBL can be applied in learning using LKPD. LKPD contains study guides that can train students' critical thinking skills. Referring to the results of interviews with two class X biology teachers at SMAN 1 Pesanggaran, Banyuwangi it is known that during the biology learning process they still use primary sources from school books. The schoolbook, especially on environmental change material, only contains general information and basic questions related to the concept of the material, but has not been able to train critical thinking. In the book, there are no practicum activities that can practice critical thinking skills When interviews with five students in class X also showed low critical thinking skills, indicated by low learning outcomes of students related to making problem formulations, making variables, designing experiments and drawing conclusions during practicum activities. This shows learners have not mastered critical thinking skills which means that the material is not yet fully understood well.

One of the LKPD that has been developed about environmental change is the LKPD developed by Afkarina (2023) to produce LKPD that is suitable for use in learning with a validity score of 95.7% with a very valid category. The level of validity obtained is reviewed based on several criteria such as content eligibility, presentation, and language. Here the researcher conducts further research by adapting the LKPD that Afkarina has developed (2023) by adjusting the circumstances and conditions of students at SMAN 1 Pesanggaran, Banyuwangi. Here researchers develop teaching modules that have advantages that contain Problem Based Learning (PBL) features and indicators of critical thinking skills or critical things, besides that teaching

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modules are in accordance with the current independent curriculum. Furthermore, researchers want to develop a critical thinking skills test instrument consisting of pretest and posttest questions in measuring cognitive learning outcomes. The purpose of this study is to describe the application of LKPD based on Problem Based Learning (PBL) environmental change materials based on learning implementation, critical thinking skills, and student responses. Based on the explanation that has been explained, here the researcher wants to conduct a study entitled: "Application of LKPD Based on Problem Based Learning (PBL) Environmental Change Material to Train Critical Thinking Skills of Class X High School Students".

METHODS

This research included pre-experimental design research. This study consists of three stages, namely preparation, implementation, and data analysis. Analysis methods include the implementation of teaching modules, critical thinking skills, and student responses. This research was carried out in May 2024 and was carried out in three classes, namely, X 1, X 2, and X 3, with class X 1 consisting of 33 students, X 2 consisting of 33 students, and X 3 consisting of 32 students in the even semester of the 2023/2024 academic year.

The variables of this study are the implementation of learning, students' critical thinking skills, and students' responses. The implementation of learning was measured by the LKPD implementation instrument sheet which was observed by 1 observer, namely a biology teacher at SMAN 1 Pesanggaran, Banyuwangi. The data from the observation of the implementation of LKPD is in the form of a checklist list with the answer criteria "Yes" and "No" in (Table 1).

Table 1. Guttman scale criteria

Answer	Score
Yes	1
No	0

The score analysis that has been obtained is then expressed in the form of percentages calculated as follows.

$$\text{Implementability (\%)} = \frac{answer \text{ "Yes"}}{\Sigma \ all \ aspect} \times 100\% \ldots\ldots\ldots(1)$$

The results of the percentage calculation obtained are then interpreted into the scale in (Table 2).

Table 2. Criteria for scoring the implementation of teaching modules (Riduwan, 2012).

Percentage Range (%)	Category
< 35	Impractical
36-51	Less practical
52-69	Quite practical
70-85	Practical
86-100	Very practical

It is said that it is carried out well if all stages of student orientation on problems, organizing students to learn, providing guidance on group or individual investigations, developing and presenting results, analyzing, and evaluating the process is carried out by > 75% in the teaching and learning process.

Students' critical thinking skills were reviewed based on observation sheet instruments, the implementation of critical thinking skills activities, and the completeness of the achievement of students' critical thinking indicators through pre-test and post-test sheet instruments. Observation data on the implementation of critical thinking skills activities was obtained through observations conducted by 4 observers. The data aspects of the implementation of student activities that have been compiled are scored according to (Table 3).

Table 3. Guttman Scale Criteria

Answer	Score
Yes	1
No	0

The score analysis that has been obtained is then expressed in the form of percentages calculated as follows.

$$\text{Implementability (\%)} = \frac{\Sigma \ students \ who \ do \ aspect}{\Sigma \ all \ students} \ldots\ldots\ldots(2)$$

The results of the percentage calculation obtained are then interpreted into a scale that is in (Table 4).

Tabel 4. Score Interpretation criteria (Riduwan, 2012).

Percentage Range (%)	Category
< 35	Not good
36 -51	Less good
52 - 69	Quite good
70 - 85	Good
86 - 100	Excellent

Based on this category, the PBL-based LKPD on environmental change material to improve critical thinking skills in this study is said to be good if it gets a score of ≥ 70. The completeness of student learning outcomes was obtained from pre-test and post-test scores. Students are declared to have completed their studies when they are able to achieve a learning outcome score of ≥ 75. The results of the pre-test and post-test of students are described through individual completeness obtained from the following calculations:

$$\text{Grades} = \frac{score}{maximum \ score} \times 100\% \ldots\ldots\ldots\ldots\ldots\ldots(3)$$

The results of the pre-test and post-test obtained are then described to determine the increase in learning outcomes using the calculation of N-gain score, the formula is as follows:

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N-Gain Score $= \frac{post\ test\ score\ -\ pre\ test\ score}{100\ -\ pre\ test\ score}$.................(4)

Furthermore, the results of the N-gain score obtained are interpreted based on the low, medium, and high categories described in (Table 5).

Table 5. Gain Index Interpretation (Riduwan, 2012)

Score	Category
g < 0.3	Low
0.3 < g < 0.7	Middle
g > 0.7	High

Response questionnaire data is in the form of score assessment on each student's response related to learning activities. The researcher uses the Guttman Scale in the form of a statement sentence with a choice of "Yes" and "No" answers. The questionnaire responses that have been distributed are categorized as good if they get a score of ≥ 75. Furthermore, the results of the questionnaire were analyzed descriptively using the percentage formula as follows:

Response (%) $= \frac{answer\ "Yes"}{\Sigma\ all\ students}$ x 100%............................(5)

Furthermore, after the percentage of responses is known, it will be interpreted with (Table 6).

Table 6. Interpretation Criteria Score of student responses (Riduwan, 2012).

Percentage Range (%)	Category
0 - 48	Not positive
49 – 61	Less positive
62 – 74	Quite positive
75 – 87	Positive
88 - 100	Very positive

RESULTS AND DISCUSSION

The results obtained during this research were as follows:

Implementation of Learning Activities

Observations of the implementation of the lesson were observed by one observer, namely the biology subject teacher at SMAN 1 Pesanggaran, Banyuwangi. Learning implementation data is presented in the table below (Table 7).

Table 7. The results of observations on the implementation of learning using LKPD 1 based on Problem Based Learning (PBL) at the first meeting

No	Aspect	X 1 (%)	X 2 (%)	X 3 (%)	Average	Category
1	Introduction	83,3	100	100	94,43	VP
2	Core activities	100	100	100	100	VP
	Problem orientation	100	100	100	100	VP
	Organizing learners	100	100	100	100	VP
	Guiding the investigation	100	100	100	100	VP
	Develop and present results	100	100	100	100	VP
	Analyze and evaluate	100	100	100	100	VP
3.	Closing	100	100	100	100	VP
Total					994,43	
Average					99,44	
Category					VP	

Information:
VP: Very Practical

Tabel 8. The results of observations on the implementation of learning using LKPD 1 based on Problem Based Learning (PBL) at the second meeting.

No	Aspect	X 1 (%)	X 2 (%)	X 3 (%)	Average	Category
1	Introduction	100	83,3	100	94,43	VP
2	Core activities	100	100	100	100	VP
	Problem orientation	100	100	100	100	VP
	Organizing learners	100	100	100	100	VP
	Guiding the investigation	100	100	100	100	VP
	Develop and present results	100	100	100	100	VP
	Analyze and evaluate	100	100	100	100	VP
3.	Closing	100	100	100	100	VP
Total					994,43	
Average					99,44	
Category					VP	

Information:
VP: Very Practical

Based on tables above, the results of observation of the implementation of learning show that the average percentage of all aspects observed includes the introduction, the core activities including Problem orientation Organizing learners, Guiding the investigation, Develop and present results, Analyze and evaluate and also closing obtain a percentage of 99,44% with efficient category. In the preliminary aspect, the whole class obtained an average of 94,43%, categorized as very good. This shows that the teacher has conveyed the learning objectivies and prepared students. Regarding core activity aspects, the two classes entire problem based learning stage has an average of 100% and is

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categorized as very good. This is because the teacher can guide students in working on Problem orientation Organizing learners, Guiding the investigation, Develop and present results, Analyze and evaluate and also closing stage, and practical work on students worksheets 1 and 2. In the closing aspect, the class averages 100% (excellent). The teacher can guide students to conclude a lesson correctly. One way to develop students interest and motivation to learn is to use interesting learning media (Febrita & Ulfah, 2019).

The results of the analysis show that in general the teacher's ability to carry out learning using the PBL model has been carried out well. The learning process by applying PBL is able to make students active in understanding the material. Learning activities with simple experiments, apart from being able to make students more active in learning, are also able to develop students' understanding of concepts and high-level critical thinking skills (Masduriah, 2020). Referring to the results of the analysis, it reveals that the teacher's ability to implement Problem Based Learning has been carried out very well.

Critical Thinking Skills

Four observes assed the scientific process skills of UNESA FMIPA Biology students. Observation results of students' critical thinking abilities during learning activities were carried out by Observer 1, Observer 2, Observer 3, and Observer 4. The overall average percentage of science process skills from the three classes, namely X 1, X 2, and X 3, is presented in Table 9 following (Table 9).

Table 9. Observation results of students critical thinking skills activities

No	Critical Thinking Skills	X 1 (%)	X 2 (%)	X 3 (%)	Average	Category
1	Interpretation	100	100	100	100	E
2	Inference	99,3	93,4	95	95,92	E
3	Explanation	94,7	94,0	93,7	94,18	E
4	Analysis	90,1	93,4	92,5	92,01	E
5	Evaluation	90,7	97,3	95	94,38	E
6	Self Regulation	94,0	96,0	93,7	94,62	E
Total		669	674	670	671,14	E
Average		94,8	95,7	95	95,19	E
Category		E	E	E	E	E

Information:

E: Excellent

Students' critical thinking skills are trained by involving students' mental, physical, intellectual, and social abilities to build cognitive abilities so that they can master knowledge competencies, skills and attitudes that can be applied in everyday life (Sari et al, 2022). Critical thinking skills can be trained through PBL-based learning, which has the advantages of being able to train students to learn to understand the material by relating experiences and events of daily life with the learning to be learned. Based on table 9 regarding the percentage of observation of the implementation of students' critical thinking skills, the highest average percentage is found in the interpretation aspect and is categorized as very good. This is because all students carry out activities to identify the statement of an environmental problem correctly, the problem is well presented in the form of articles contained in the LKPD at the problem orientation stage. Unlike the analysis stage, it tends to get the lowest percentage because students still have little difficulty analyzing the causes and effects of global issues in related news articles, relating the cause and effect of these events, so they need a little help formulating questions and presenting them in a data. However, in detail the data obtained are well organized, able to answer structured questions appropriately, answer questions by relating existing facts (results of eco enzyme experiments) with relevant theories, and all data are analyzed carefully and accurately, thus further strengthening students' understanding. During the process of analyzing data, students can do so by answering questions on LKPD that lead to finding concepts independently (Yupiyanto & Trisnaningsih, 2020). However, overall in each class there has been an improvement in all aspects that are categorized as excellent.

The difference in the average value of the percentage shows that students can follow and understand the learning process well using LKPD based on PBL. When working on questions in LKPD, students actively contribute to doing practice questions in LKPD along with teacher explanations that explain in detail concrete examples around the environment. So that students can explain all stages of PBL well in LKPD 1 containing the manufacture of eco enzyme and in LKPD 2 containing harvesting and testing eco enzyme. This shows that students have implemented the learning process which is indicated by differences in scores caused by differences in the abilities of each student when participating in learning activities. The completeness of cognitive learning outcomes is known through the provision of pre-test and post-test. The pre-test is applied at the

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beginning of learning, namely at the first meeting, while the post-test is carried out at the end of learning. Data regarding the completeness of learning outcomes of students' critical thinking skills are said to be complete if they exceed the Minimum Completeness Standards owned by SMA Negeri 1 Pesanggaran, Banyuwangi which is ≥ 75. Data on learning completeness outcomes are presented in (Table 10).

Table 10. Data analysis of the completeness indicators of critical thinking skills pre-test and post-test.

Indicators	X 1		X 2		X 3	
	Pre (%)	*Post (%)*	*Pre (%)*	*Post (%)*	*Pre (%)*	*Post (%)*
1	75,38	99,62	15,38	92,2	17,5	90
2	22,73	93,18	38,46	82,5	32,5	87,5
3	42,42	82,95	2,5	89,5	2,5	87,5
4	60,98	78,41	23,07	84,61	17,5	80
5	38,64	94,32	48,71	94,87	20	80
6	33,33	97,73	20,51	87,17	2,5	90
T	45,58	91,04	24,77	88,48	15,42	85,83
C	L	E	L	E	L	E

Information:

1: Interpretation   6: Self Regulation
2: Inference   T: Total
3: Explanation   C: Category
4: Analysis   L: Lower
5: Evaluation   E: Excellent

Based data from Table 10 the results of analysis of the completeness of the science process skills indicators, obtained from the pre-test and post-test can be seen that the average percentage of mastery of the class X 3 posttest indicators is 45,46% of the average percentage of completeness of the pretest indicators. In class X 2, mastery indicators increased by 63,70% from the average pretest mastery indicator previously. In class X 3, mastery indicators increased by 70,42% from the average percentage of pretest mastery indicators. The increase that occurred was shown by the acquisition of post-test scores after the application of the learning process using LKPD based on PBL higher than the pre-test scores at the beginning of learning. The low learning outcomes are due to many factors, especially teacher and student factors. As an essensial component in the teaching and learning process. Afifah (2023) states that the knowledge gained by students by exploring and building their own knowledge will be easy to remember. The highest completeness indicator was 89.47% in the explanation and analysis indicators. This is because when learning using LKPD based on Problem Based Learning, before students learn about pH and temperature measurement, investigate what variables are related to practicum, the teacher first describes and gives examples of how to measure and use tools and explains how to determine variables in experiments. Likewise, when analyzing data, students are taught how to make good and correct analysis sentences by answering questions on LKPD 1

and LKPD 2. The lowest percentage of completeness indicators in class X 1 is inference, and in class X 3 is an indicator of self-evaluation and regulation. This is because students are still not very proficient in determining hypotheses based on problem formulations related to solving environmental problems. In the indicators of evaluation and self-regulation, learners need to understand more to make conclusions based on the data that has been obtained. According to Paat (2021), the low level of mastery of students regarding learning concepts and materials results in low learning outcomes obtained by students, lack of student involvement in learning activities and teacher-centered learning.

An N-gain test was then carried out with data analysis of the results of the pre-test and post-test to find out whether critical thinking skills had been trained, from the calculation of N-gain in each class, there was an increase in the high category. This is shown in the posttest scores obtained after applying the PBL based student worksheets, which is more improved than the pretest obtained by students before applying the student worksheets. Based on the specified minimum completeness criteria, namely ≥75%, the three classes have fulfilled the minimum criteria of 100% obtained from the posttest results and the average percentage of observations of critical thinking skills. This is consistent with the study results of Habibah et al, (2017) that PBL learning can advance students' critical thinking skills as indicated by an increase in post-test results. In addition, another study conducted by Maulia (2022) showed that the percentage of student activity increased after using the LKPD Problem Based Learning learning model from an average of 52.1% to 81.9% with the very active category.

Student Response

Student response questionnaires were given to each class X 3, X 10, and X 12 SMA Negeri 1 Pesanggaran, Banyuwangi contains 15 questions. The following are the results of student responses to learning using PBL based worksheets (Table 11).

Table 11. Student response data to learning using Problem Based Learning based student worksheet.

No	Statement	Presentation			Average
		X 1	X 2	X 3	
1	The learning objectives in the LKPD are clearly written.	100%	100%	88%	96%
2	The time allocation provided is enough to work on LKPD.	92%	90%	94%	92%
3	The instructions for working on the LKPD are clear and concise.	100%	100%	91%	97%
4	The steps of activities in the LKPD are easy	88%	97%	91%	92%

No	Statement	Presentation			Average
		X 1	X 2	X 3	
	to implement.				
5	The practice of formulating problems in LKPD is easy to do.	91%	98%	94%	94%
6	The practice of formulating a hypothesis in the LKPD is easy to do.	100%	97%	91%	96%
7	The practice of designing experiments in LKPD is easy to do.	100	100%	94%	98%
8	The practice of conducting experiments in LKPD is easy to do.	88%	100%	91%	93%
9	The practice of collecting data in LKPD is easy to do.	97%	88%	97%	94%
10	The practice of analyzing data in LKPD is easy to do.	97%	97%	94%	96%
11	The exercise of drawing conclusions in the LKPD is easy to do.	94%	97%	91%	94%
12	LKPD can help understand the concept of environmental change material.	100%	100%	100%	100%
13	The appearance of LKPD is very interesting.	100%	100%	100%	100%
14	The pictures on the LKPD are quite clear and add to understanding.	98%	100%	94%	97%
15	The language used in the LKPD is easy to understand.	100%	95%	92%	96%
Total					1435,3
Average					95,69
Category					Very Positive

Referring to the Table 11, it indicates that the three classes have an average percentage of 95.69% with categories classified as very positive. In addition, there are several statement points with a high positive response, including the statement points "the appearance of this LKPD is interesting" and "this LKPD helps your concept understanding of environmental change material". It can be seen that the appearance of LKPD attracts the attention of students to learn and understand environmental change material. Munawaroh (2022) stated that LKPD which is presented is not monotonous, namely with pictures and has a fairly good design, therefore that students can understand the material taught. One of the functions of LKPD is a teacher tool in the learning process to attract interest from students (Nirmalayani, 2022). The statement point that received the lowest response was the allocation of enough time provided to do it. This is because students do not cooperate and maximize learning time so that during simple experimental activities (practicum) and data analysis requires a long time. The response of students related to LKPD which helps understand the concept of very positive environmental change material shows that LKPD can help improve learning outcomes, it can be seen that a series of activities contained in LKPD based on PBL can make it easier for students to understand the material while practicing critical thinking skills. This PBL-based student peseta activity sheet makes students participate more actively in the learning process, helps find and understand concepts about environmental change material, and provides a vehicle for interaction between teachers and students.

CLOSING

Conclusion

The implementation of learning with LKPD based on PBL in practicing critical thinking skills on environmental change material, overall in all classes can be carried out with a very good category reaching 99.44% in all aspects that have been observed.

The critical thinking skills of students throughout the class amounted to 95.19% included in the excellent category. And indicators of students' critical thinking skills are shown from the pre-test and post-test results in grade X 1 91,04% complete. In class X 2 88.48% complete. In class X 3 85.83% complete. Referring to the results of the N-Gain test in three classes, it was found that there was an increase in students' critical thinking skills which was known through pretests and posttests at the beginning of learning and at the end of learning using LKPD based on Problem Based Learning.

The responses given by students included a very positive response of 95.69% to learning using LKPD based on Problem Based Learning.

Sugestion

During the learning process, teachers should divide learning time well so that activities in LKPD work can be completed on time. In simple experimental activities, teachers should guide and guide the performance of students in conducting experiments, so that students can discuss with the group. During practicum, it is expected to be thorough and careful so that the practicum can take place properly.

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