

## The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students



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**ABSTRACT:** The learning process carried out is still teacher-centered in conventional ways such as lectures and the lack of use of learning materials or supporting learning devices. This study aims to test the effectiveness of scientifically-based E-LKPD in improving students' critical thinking skills and learning interest in the body's defense system material. This type of research is quasi-experimental with a pre-test design and post-test control group design. The research was conducted at Senior High School 2 Sleman. Limited trials were conducted in class XI MIPA 1 and field trials were carried out in class XI MIPA II as an experimental class and class XI MIPA II as a control class. The sampling technique is carried out by cluster random sampling. Data collection used several instruments, namely interviews, needs analysis questionnaires, assessment questionnaires for material experts, media expert assessment questionnaires, RPP expert assessment questionnaires, syllabus expert assessment questionnaires, biology teacher assessment questionnaires, student response questionnaires, learning interest questionnaires, critical thinking test sheets. Data analysis techniques use the normality test, homogeneity test, T-test, Mann-Whitney test, and n-gain score. The results obtained from this study revealed that the use of scientifically-based E-LKPD in the learning process is effective in improving the critical thinking skills and learning interests of students. Improving students' critical thinking skills is included in the high category with an n-gain value of 0.76 and interest in learning with an n-gain value of 0.75 is also included in the high category.

**KEYWORDS:** E-LKPD is scientifically based, critical thinking skills, interest in learning.

### I. INTRODUCTION

Education plays an important role in life. Because of the existence of education, a person will get various experiences that are very useful for life in the future. Education is also said to be an absolute necessity for every individual because education is one of the keys to changing times. So important is education, making every country around the world compete in improving the education system they implement so that with these improvements make the next generation of the nation they have can create changes that are beneficial to their lives, both the nation and the state. It is supported by (Parmin et al., 2016) who said that education is an important role in helping students to grow and innovate and get targeted goals.

Improvements related to the education system are also carried out by Indonesia. So far Indonesia has also increasingly improved the education system applied in the world of education, this is done so that the next generation of the nation owned by Indonesia gets an experience that can later be used to create changes for the better in the future. The Government of Indonesia has made various efforts in improving the education system to improve the quality of education and improve the quality of human resources. One of the efforts made by Indonesia is improving the education system through the curriculum.

The curriculum is a set of plans in the learning process and arrangements related to objectives, basic competencies, standard materials, and learning outcomes as well as how to use guidelines for implementing learning activities to achieve basic competencies and educational objectives (Brooman et al., 2015; Daniel, 2016). The curriculum in Indonesia has changed in recent years. This aims to make improvements in improving the quality of Indonesian Education including the development of several methods, models, approaches, and learning strategies. The curriculum changes that occur are motivated by the demands of the needs of the times as a form of development in the field of Education. With various problems in Indonesia and the demands of world development, changes in the national curriculum have been encouraged to arrive at the 2013 curriculum.

## **The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students**

The implementation of the 2013 curriculum includes strengthening spiritual attitudes, social attitudes, knowledge, and skills in the learning process. The learning process is the main key to student learning activities. In the 2013 curriculum, learning activities need to use the principles of 1) learner-centered, 2) developing student creativity, 3) creating fun and challenging conditions, 4) containing values, ethics, aesthetics, logic, and kinesthetics, and 5) providing diverse learning experiences through the application of various learning strategies and methods that are fun, contextual, effective, efficient, and meaningful (Permendikbud No. 65 of 2013).

Based on the analysis of abilities needed in the 21st century, the 2013 curriculum emphasizes the pedagogic dimension in learning, namely using a scientific approach (Fishman, 2019). Learning using a scientific approach is a learning process designed in such a way that students become active in constructing a concept, law, or principle through the stages of observing which are activities to identify and find problems, then formulate problems, propose or formulate hypotheses, collect data with various techniques, analyze data, draw conclusions and communicate concepts, laws, or principles that have been found. As for according to (Asyhari & Hartati, 2015), states that the learning objectives using the Saitifik approach include improving intellectual abilities in students, especially the ability to think in higher order or critical thinking, shaping students' ability to solve a problem systematically, obtaining high learning outcomes, training students in communicating ideas, specifically in writing scientific papers and also develop student character.

Biology is one of the subjects that demands critical thinking skills because it has a fairly high level of difficulty (Gray et al., 2018). One of them is like the material of the body's defense system. The body's defense system is a biological material that discusses the structure and function of the body's immunity including antigens and antibodies, the body's defense mechanisms, inflammation, allergies, and immunization. The material of the body's defense system is considered difficult because it cannot be observed directly or with the naked eye and is difficult to visualize such as the structure of antigens, antibodies, and processes of the body's defense system mechanisms. With this, the understanding of students can be helped by using teaching materials that can explain the material of the body's defense system simply representing the scope of the body's defense system material but easily understood by students.

Based on the results of interviews with biology teachers at school, shows that teaching and learning activities on the body's defense system material have not run optimally due to several things. Such as the difficulty of students in understanding the material, and lack of time in delivering information related to the body's defense system material. From the results of interviews that have been conducted by researchers, it is known that learning about the material of the body's defense system that is carried out has not been fully centered on students. The learning process carried out by teachers is still one-way using the lecture method. Learning by using students' critical thinking methods due to the lack of student activity in obtaining concepts (Athletic & Clinical, 2012; Setiadi & Elmawati, 2019). As quoted during an interview related to the question of how students' critical thinking skills in biology learning, biology teachers explained: "Students' critical thinking skills cannot be categorized as good or high. During the learning process, students tend to be passive and ask fewer questions and answer questions". It is also supported by the data generated  $\leq 50$ . The weakness of the lecture method that causes boredom in students is also supported by data from questionnaires distributed to students related to the question of whether students often feel bored during the biological learning process with the results of 68% of students answering yes. Data from the questionnaire also showed that 84% of students had difficulty understanding biology material and stated that biology is a material that has a lot of memorization, causing boredom in following the process of learning activities.

From the observations related to the use of teaching materials in biological material learning activities, it was found that there was still a lack of innovative teaching materials. In the learning process, biology teachers still use makeshift teaching materials such as textbooks and simple printed LKPD. From the results of teacher interviews, it was explained that teachers have not fully used LKPD on every biological material in the learning process. Some biological materials use LKPD and some do not, one of which is the body's defense system material where in the learning process the teacher has not used LKPD as teaching material in the process of learning activities.

From the results of the questionnaire distributed, 76% of students said that they would be more interested in learning biological material if biological material was presented in a more interesting form. Therefore, there is a need for procurement or innovation in presenting interesting teaching materials for students so that in the process of learning biology students have an interest in the learning process. While in reality as explained in the paragraph above, the teaching materials used in the learning process are still limited. Some LKPD used in the learning process only contain concept questions and have not contained learning activities that support the improvement of critical thinking skills in students simple print form causes low critical thinking skills in students and a lack of a sense of student triviality in following biology learning.

## **The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students**

Learning that has not been centered on students and the use of teaching materials that have not been maximized causes problems in the form of students who are less active in learning and have low interest in learning in students, therefore learning the body's defense system should use an active learning approach that can create student-centered learning. According to (Marlina, 2020; Road & Kingdom, 2016) The learning process requires several kinds of approaches, media, and teaching materials to improve student achievement. In addition, it is necessary to create a learning atmosphere that makes students more active and motivated in participating in learning activities.

To improve students' critical thinking skills and generate a sense of interest in learning in students, the right teaching materials are needed. One of the teaching materials that can be used in the learning process on the body's defense system material is E-LKPD with a scientific approach. The selection of scientifically-based E-LKPD is because the LKPD will later apply the learning process with scientific steps in the learning process such as observing, questioning, trying, reasoning, and communicating that support critical thinking skills in students. As explained by (Capital et al., 2013) Which says that the learning process in which it combined with scientific activities will provide good learning outcomes for students. With the use of scientifically-based E-LKPD, it is expected to improve critical thinking skills in students, because the synthetic approach is one approach that can support the improvement of critical thinking skills in students. It is supported by (Fuad, 2017) who said that a scientific approach can improve intellectual in learners, especially critical thinking skills. (Utami et al., 2016) also explained that LKPD is one of the teaching materials that can help in improving critical thinking skills in students because it helps students find and develop concepts through the activities presented in it and through the questions in the LKPD.

The choice of E-LKPD as teaching material is also because LKPD can be designed and developed according to the conditions and needs of students, to improve the quality of the process during learning. Therefore, there is a need for innovation in teaching material sources by developing an interesting E-LKPD through the addition of new things or innovations that present a variety of interesting features to foster student interest and motivation so that later they can train critical thinking skills and obtain satisfactory learning outcomes.

The use of teaching materials in the form of E-LKPD will make learning activities more interesting. In addition, the use of E-LKPD teaching material resources combined with a scientific approach will emphasize the existence of a scientific process that includes 5M, so that learning process activities will be more meaningful, and interesting, and can build student learning interest, so that students can achieve completeness of learning outcomes in the learning process. Based on this background, the purpose of this study is to determine the effectiveness of E-LKPD Based on a Scientific Approach to Immune System Material to Improve Critical Thinking Skills and Learning Interests of Class XI High School Students.

## **II. MATERIAL AND METHODS**

This research method is quantitative with quasi-experimental research types with pre-test design and post-test control group design. The research was conducted at Senior High School 2 Sleman. Limited trials were conducted in class XI MIPA 1 and field trials were carried out in class XI MIPA II as an experimental class and class XI MIPA II as a control class. The sampling technique is carried out by cluster random sampling. Data collection used several instruments, namely interviews, needs analysis questionnaires, assessment questionnaires for material experts, media expert assessment questionnaires, RPP expert assessment questionnaires, syllabus expert assessment questionnaires, biology teacher assessment questionnaires, student response questionnaires, learning interest questionnaires, critical thinking test sheets. Data analysis techniques use the normality test, homogeneity test, T-test, Mann-Whitney test, and n-gain score.

## **III. RESULTS AND DISCUSSION**

### **1. Results of Analysis of the Effectiveness of E-LKPD on Learning Interest**

To determine the effectiveness of E-LKPD in students, the results of student learning interest data will be analyzed using nonparametric statistical tests. Nonparametric tests are used because the learning interest data is ordinal. Tests were performed using the Mann-Whitney test. The results of the Mann-Whitney analysis can be seen in the following table.

# The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students

**Table 1. Post-Test Data Results of Student Learning Interest**

	Learning Interest
Mann-Whitney U	376.000
Wilcoxon W	1042.000
Z	-3.065
<b>Asymp. Sig. (2-tailed)</b>	<b>0.004</b>

The output results on the learning interest data found showed that  $p < \alpha$  (0.004 < 0.05), meaning that there is a real difference between the control class and the experimental class so that it is concluded that the use of scientifically-based E-LKPD affects the learning interest of students.

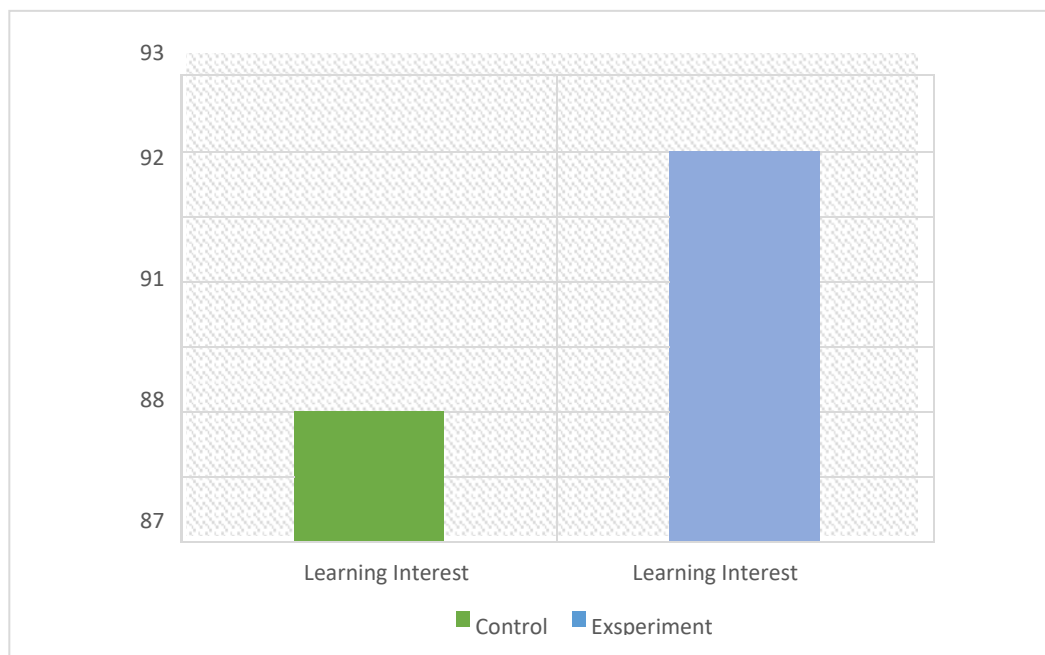
## 2. Increased Interest in Learning Students

From previous Mann-Whitney testing data, it is known that there are differences between the control class and the experimental class related to learning interest in students on the subject of the body's defense system. To determine the significant influence between the control class and the experimental class on the use of scientifically-based E-LKPD in influencing the increase in student learning interest, it can be seen based on the N-gain score presented in the following table.

**Table 2. Data on Increasing Student Learning Interest**

Class	Learning Interest			Categories
	Pretest	Posttest	Skor <i>n-gain</i>	
Control	66,31	88,05	0,64	Keep
Experiment	66,73	92,13	0,75	Tall

Based on the table above, it can be explained that there is an increase in the interest in learning students in both control and experimental classes, but the level of improvement in each class is different. In the control class, there was an increase in the medium category with a score of 0.64 while in the experimental class, there was an increase in the high category with a score of 0.75. Based on these results, it can be concluded that the use of scientifically-based E-LKPD provides a better increase in the learning interest of experimental class students compared to control classes that do not use scientifically-based E-LKPD. See the difference in increasing student interest in learning in control classes and experimental classes after using scientifically-based E-LKPD is presented in the following graph.



**Figure 1. Increased Learning Interest in Control Class and Experimental Class**

# The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students

The significant difference between the learning interest of control class students and experimental classes indicates that scientifically based E-LKPD is effective in increasing student learning interest.

### 3. Parametric Test of Initial Ability of Critical Thinking Skills

#### 1) Normality Test

Pretest data on critical thinking skills were analyzed for normality. Data normality testing is carried out by each class, namely the control class and the experimental class. This analysis is to determine the distribution of normality data, which has a normal distribution of research data that has been obtained. The normality test is analyzed using the Shapiro-Wilk test with the criteria said to be normally distributed data if the significance value  $> 0.05$  and if the significance value  $< 0.05$  then the data obtained is not normally distributed. To find out the results of the normality test in both classes can be seen in the following table:

**Table 3. Data Normality Test Results Initial Ability of Critical Thinking Skills**

	Kelas	Shapiro-Wilk		
		Statistic	Df	Sig.
Pretest critical thinking skills	Control	.869	36	.001
	EXsperiment	.806	36	.000

Based on the results of the analysis of the initial critical thinking skills data normality test above, it can be seen that the control class and experimental class have a significance value of less than  $\alpha$  (Sig  $< 0.5$ ). In the control class, it has a significance value of  $0.001 < 0.05$  and in the experimental class, it has a value of  $0.000 < 0.05$ . This value indicates that the data obtained related to early critical thinking skills are not normally distributed.

#### 2) Homogeneity Test

A homogeneity test is carried out to find out whether the data obtained have the same variance or are homogeneous. Homogeneity testing is performed statistically using Leven's test. The criteria for homogeneity testing is the sig value.  $> \alpha$  (sig.  $> 0.05$ ) then the data is said to have the same or homogeneous variance, but if the value of sig.  $< \alpha$  (sig.  $< 0.05$ ) It is said that the data obtained does not have the same variance or is not homogeneous. To see the results of the homogeneity test of initial critical thinking skills can be seen in the following table.

**Table 4. Data Homogeneity Test Results in Initial Ability of Critical Thinking Skills**

Test Of Homogeneity of Variances			
Critical Thinking Skills			
Leven statistic	df 1	df 2	Sig.
.011	1	70	.098

Based on the results of the homogeneity test data of initial critical thinking skills presented in the table above, it is known that the control class and experimental class have a significance value greater than  $\alpha$  ( $0.098 > 0.05$ ), with these results it can be concluded that the two classes used both control and experiment have the same variant or it is said that both classes are homogeneous.

#### 3) Test Hypotheses Early Abilities of Critical Thinking Skills

From the results of the prerequisite test, the initial critical thinking skills data do not meet the requirements for advanced parametric tests, so to make decisions regarding whether the initial abilities of students between the experimental class and the control class are the same, a non-parametric test will be carried out using the Mann-Whitney test. The decision criteria in the Mann-Whitney test are said to have no significant difference in the object of research used if the Sig.  $> \alpha$  value (sig.  $> 0.05$ ). However, if the value of Sig.  $< \alpha$  (Sig.  $< 0.05$ ) then there is a significant difference in the object of research used. The results of the Mann-Whitney test can be seen in the following table.

**Table 5. Outcome Data Early Ability of Critical Thinking Skills**

	Critical thinking skills
	Mann-Whitney U
Wilcoxon W	1285.500

## The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students

Z	-0.324
Asymp. Sig. (2-tailed)	.746

Based on the data obtained, the results of the initial critical thinking skills test of students in the experimental and control classes have a Sig value of  $> \alpha$  ( $0.746 > 0.05$ ). It can be concluded that the experimental class and the control class have the same ability, there is no difference related to critical thinking skills in students from the two classes used.

### Parametric Test Data Post-Test Learners' Critical Thinking Skills

#### Normality Test

Data on the results of the critical thinking skills posttest were also analyzed for normality. Testing of critical thinking skills posttest data was also carried out in each experimental class and control class to determine whether the posttest data produced was normally distributed in its distribution. The normality test is performed using the Shapiro-Wilk test. The decision criteria in the normality test using the Shapiro Wilk test is that if the sig value  $> 0.05$ , it means that the post-test data of critical thinking skills are normally distributed, while if the sig value is  $< 0.05$ , the post-test data of critical thinking skills is not normally distributed. Here's a table of normality test results and post-test critical thinking skills.

**Table 6. Critical Thinking Skills Posttest Data Normality Test Results**

		<i>Shapiro-Wilk</i>			
		Kelas	Statistic	df	Sig.
Pretest thinking skills	criticalControl		.165	36	.026
	Exsperiment		.130	36	.002

From the data obtained in the posttest normality test of critical thinking skills, it is known that the significant values obtained are not normally distributed. This is evidenced by the significant values listed in the table above with significant value information in the control class  $0.02 < 0.05$  and in the experimental class with significant value information of  $0.002 < 0.05$ .

#### 1. Homogeneity Test

Homogeneity testing using posttest data on critical thinking skills was carried out to analyze the variance of the research sample used. Homogeneity testing is performed statistically using Leven's test. The criteria for homogeneity testing is if the sig value.  $> \alpha$  (sig.  $> 0.05$ ) then the data is said to have the same or homogeneous variance, but if the value of sig.  $< \alpha$  (sig.  $< 0.05$ ) it is said that the data obtained does not have the same variance or is not homogeneous. Based on the results of the homogeneity test using Leven's test, the results are obtained as listed in the following table.

**Table 7. Data Homogeneity Test Results in Post-Test Critical Thinking Skills**

Test Of Homogeneity of Variances			
Critical Thinking Skills			
<i>Leven statistic</i>	df 1	df 2	Sig.
.011	1	70	.857

The following table shows the result of a significant value that is greater than the  $\alpha$  value. It is known that the homogeneity test data posttest critical thinking skills in the experimental class and control class obtained values of  $0.857 > 0.05$ . Then it can be decided that the variance in the research sample used is homogeneous.

#### 1) Hypothesis Test Learners' Critical Thinking Skills

Because the results of the parametric prerequisite test do not qualify for hypothesis testing using the T-Test, the hypothetical test to see the effectiveness of scientifically-based E-LKPD in improving critical thinking skills is analyzed using a nonparametric hypothesis test, namely the Mann-Whitney test.

#### 1) Analysis of the Effectiveness of E-LKPD on Critical Thinking Skills

The effectiveness of the scientifically based use of E-LKPD on critical thinking skills was analyzed using a nonparametric test with the Mann-Whitney test. The decision criteria in the Mann-Whitney test are said to have no significant difference in the object of

## The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students

research used if the Sig. >  $\alpha$  value (sig. > 0.05). However, if the value of Sig. <  $\alpha$  (Sig.< 0.05) then there is a significant difference between the two groups tested. The results of the Mann-Whitney test can be seen in the following table.

**Table 8. Post-Test Data Results of Critical Thinking Skills**

	<b>Critical thinking skills</b>
Mann-Whitney U	388.500
Wilcoxon W	1054.500
Z	-2.940
<b>Asymp. Sig. (2-tailed)</b>	<b>.003</b>

The output results obtained showed that the sig value <  $\alpha$  (0.003 < 0.05), meaning that the criteria from the posttest data results obtained had a significant difference between the control class that did not use scientifically based E-LKPD in the learning process and the experimental class that used scientifically based E-LKPD in the learning process so that a decision could be made that scientifically based E-LKPD affects critical thinking skills in students. Here it can be concluded that  $H_0$  is rejected and  $H_a$  is accepted.

The significant influence on posttest results between the control class and the experimental class shows that scientifically based E-LKPD is effective in increasing students' interest in learning and critical thinking skills. The magnitude of the increase obtained can be seen in the analysis of the N-gain test.

### 2) Improved Critical Thinking Skills

Improving the critical thinking skills of students who use scientifically based E-LKPD and students who do not use E-LKPD are analyzed using the Normalized Gain Score (N-Gain Score). Improving students' critical thinking skills before and after the learning process can be seen in the following table.

**Table 9. Data Results Improved Critical Thinking Skills**

Class	Critical Thinking Skills			Categories
	Pretest	Posttest	Skor <i>n-gain</i>	
Control	38.72	79.22	0,66	Keep
Exsperiment	38.22	84.83	0,76	Tall

Based on Table 25, it can be seen that there is an increase in critical thinking skills in both the control class and the experimental class, but there are differences in the category of improvement in critical thinking skills in each class. In the control class, the increase in an entry in the medium category is evidenced by the n-gain score of critical thinking skills at 0.66, while in the experimental class, the increase in critical thinking skills is in the high category, as evidenced by the acquisition of an n-gain score of 0.76. Based on these data, it can be concluded that the use of scientifically-based E-LKPD provides a better improvement in the ability of critical thinking of students compared to classes that do not use scientifically-based E-LKPD.

## DISCUSSION

In this study, the results of research data were obtained from the pretest and posttest critical thinking skills and student learning interests. The data obtained will be analyzed using prerequisite tests, hypothesis tests, and N-Gain analysis. The prerequisite test in this study consists of a normality test and a homogeneity test, and the hypothesis test uses the Mann-Whitney test to see the effectiveness of the research that has been done. Once the effectiveness is known, it will proceed with N-Gain analysis on the variables of critical thinking skills and learners' learning interests.

The results of the Mann-Whitney test in this study related to critical thinking skills and learning interest also showed that Sig scores <  $\alpha$  (0.00 < 0.05), which means that it can be a significant difference in critical thinking skills and learning interests of students in control classes and experimental classes. This significant difference indicates that scientifically-based E-LKPD is effective in improving the critical thinking skills and learning interests of students from the research that has been done, to improve critical thinking skills in students is the use of E-LKPD combined with a scientific approach. Learning that uses scientifically-based E-LKPD requires students to play an active role in the learning process that will be carried out (Ekantini & Wilujeng, 2018).

## **The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students**

Scientifically based E-LKPD is effective in improving students' critical thinking skills. Scientifically-based E-LKPD affects the improvement of critical thinking skills in students because the scientifically-based E-LKPD developed contains systematic learning steps that allow the building of thinking processes in students during learning. Scientifically-based E-LKPD influences improving critical thinking skills in students because learning is designed to encourage students to be actively involved in the learning process through syntaxes in a scientific approach. As expressed (Espey, 2018) In his research, said that active student learning in the learning process can improve the critical thinking skills of the participants. The lack of critical thinking skills in students is caused by the learning process of information provided through the lecture method, or in the learning process teachers are more active and students passively listen and only record the information provided (Kartika et al., 2020; Puspita & Dewi, 2021). So the need for learning combined with a scientific approach to encourage active students in the learning process to improve critical thinking skills in students. It is supported by (Alcaide et al., 2017) who explain that the learning process is often carried out using a scientific approach (Scientific approach) to achieve goals in the learning process.

Critical thinking is a complex way of thinking which consists of giving simple explanations, building basic skills, drawing conclusions, providing further explanations, and managing strategies and tactics (Kong, 2014). The increase that occurs in critical thinking skills in students is because, in the learning process that uses scientifically-based E-LKPD, students are faced with problems and questions that allow training critical thinking skills in students. The existence of investigative or experimental activities directs students to develop their critical thinking skills by finding various problems, then analyzing the factors that cause those problems to occur. According to (Majid, 2013; Rostika & Prihantini, 2019) To obtain good learning results, students must conduct experiments or investigations. As research has been done (Cohen et al., 2017; R. M. Dewi, 2022) Explaining that the existence of a scientific learning process is expected to train students' critical thinking skills such as in analyzing and making decisions, not just listening and memorizing.

The scientifically-based LKPD developed applies the learning process with scientific steps in its learning such as observing, questioning, collecting information/investigation, reasoning, and communicating (Amthari et al., 2021). According to (Widiyanti & Nisa, 2013) Learning in which combined with a scientific approach can improve intellectually in students, especially students' skills in critical thinking. The scientific approach used in this research is because good learning is learning in which the concept of student-centered. As explained (Asnaini, 2017) Learning which encourages students to actively participate in participating in every learning activity will be able to develop and build knowledge, and the ability to reason in students. Research conducted by (Pebriani et al., 2022) Scientifically based LKPD used in the learning process can improve learning outcomes in students.

The scientifically-based E-LKPD developed is effective in improving critical thinking skills in students because the developed LKPD also contains questions that can hone critical thinking skills in students, for example in the question "Analyze what happened to Zahra after taking drugs so that it causes symptoms like those in the discourse", providing questions that encourage students to make decisions and conclude. According to (Sani, 2014) The presentation of learning in which there are scientific activities such as research, reasoning, data processing, and decision-making provides good learning outcomes to students.

Scientifically-based E-LKPD can also increase students' interest in learning because the developed E-LKPD presents several cases arranged in the form of stories or discourses on problems that often occur in the environment around the residence. The E-LKPD that has been developed not only presents monotonous rote questions such as LKPD which is often used by students in the learning process. This is in line with research that has been conducted by (Pebriani et al., 2022) which says that the teacher presenting a lesson that involves the link between the subject matter being discussed with real problems that often exist in the living environment will increase students' interest in learning the learning process.

In addition, LKPD mobile learning combined with a scientific approach can increase students' interest in learning because learning using scientifically-based E-LKPD makes learning more meaningful, the learning process is centered on students "Student-centered" where the learning process participants not only listen to the teacher explain the subject matter but carry out activities according to the syntax of the scientific approach itself. With learning combined with a scientific approach, learning is more active and not boring. This is in line with research that has been conducted (Setiyadi & Gani, 2017) Which says that learning using a scientific approach can improve aspects of attitudes in students, one of which is interest in learning. This is because learning combined with a scientific approach encourages students to actively participate in the learning process. As explained by (Arlianty, 2017) That learning which provides opportunities for students to participate actively will affect the interest in learning students themselves. In the learning process, students are directed to make observations related to problems that often occur in the surrounding environment, then direct students to conduct experiments through literature reviews and also seek information from various sources related to the problems presented about the body's defense system.



## The Effectiveness of Scientifically-Based E-LKPD on the Body's Defense System Material to Improve Critical Thinking Skills and Learning Interest of Grade XI High School Students

Here students will discuss solving each of the problems presented and examine the results of the experiments that have been carried out by each group. After students can construct the results of the discussion carried out, each group of students will communicate through presentations in class. This is also supported by research that has been conducted (Jamil, 2019) Which says that learning by which applying a scientific approach can affect the interest in learning of students. And research (Jamil, 2019) also suggests that learning combined with a scientific approach has a positive impact on increasing students' interest in learning in the learning process. Darling-hammond et al., (2020) Also explained that to be able to generate interest in learning with students, teachers must provide opportunities for students to be actively involved and participate both in groups and individually in the learning process. So the implementation of it combined with a scientific approach will encourage students to be actively involved in the learning process.

In E-LKPD, learning content is arranged in such a way as to attract students' interest in learning it. The concept of material related to the body's defense system is arranged simply, every case or problem related to the body's defense system is packaged in the form of stories or discourses, as well as the addition of learning animation videos related to the body's defense system material and photos supporting the material that can provide a sense of interest to students in the concept of learning delivered. The research that has been done by (Desmarani et al., 2022) said that E-LKPD is very effective to be used in the learning process because it can attract students' learning interest in the learning process. Research (F. Dewi & Hariyanto, 2018) also stated that the use of E-LKPD can generate students' interest in learning in the learning process. In research, Suwastini et al., (2022) said that the importance of using E-LKPD in the learning process is because the innovative E-LKPD is a teaching material need that must be met in the current 21st-century learning process. It is also supported by (Julianti & Sumarmin, 2018) which states that E-LKPD is one of the teaching materials that are indispensable in the learning process in the world of Education.

E-LKPD will provide a sense of interest to students in its use in the learning process. This sense of interest will encourage students to be able to focus on participating in every learning activity. As has been done by Chu, (2016) In his research, said that learning in it using E-LKPD will be able to capture the interest of students themselves and increase student interaction in the learning process. Research (Azmin, 2016; Wishart, 2015) said that learning using E-LKPD will make it easier to be able to access the information needed related to the material being studied quickly and at any time, the use of E-LKPD facilitates the learning process for the better. From the explanation that has been explained related to scientifically-based E-LKPD which is packaged in the form of ask, it can be used in the learning process and is effective to improve critical thinking skills and learning interest in students.

#### IV. CONCLUSION

Based on the results of research that has been conducted related to the development of scientifically-based E-LKPD, it was concluded that the scientifically-based E-LKPD that has been developed is effective in improving critical thinking skills in students. This is supported by the results of the N-Gain score analysis which is known that there is an effect of improving critical thinking skills in students.

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