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# Development of Life Based Learning E-Modules to Improve Students' Critical Thinking Skills

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**Abstract:** This study aims to develop and analyze the feasibility, practicality, and effectiveness of e-modules based on life-based learning for improving students' critical thinking skills. The research employs the Research and Development (R&D) method with the ADDIE model, which includes analysis, design, development, implementation, and evaluation. Data collection techniques included questionnaires, document checklists, and tests. The results indicated that material expert validation yielded a value of 3.83 (95.8%), categorizing it as very valid, while media expert validation resulted in a value of 3.70 (92.5%), also classified as very valid. Linguist validation achieved a value of 3.85 (96.4%), falling into the very valid category. The practicality test of the product scored 98.4%, indicating it is very interesting and practical. The t-test results revealed a significant increase in critical thinking skills after using e-modules based on life-based learning. Specifically, the pre-test average score was 64.25, and the post-test average score was 88.41. The t-test p-value was 0.00 (less than 0.05), leading to the rejection of the null hypothesis (Ho) and acceptance of the alternative hypothesis (Ha). This shows that: 1) the e-module is practical, interesting, and effective as a learning tool for enhancing students' critical thinking skills, and 2) there is a significant improvement in students' critical thinking skills.

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## Introduction

The 2003 Law No. 20 on the National Education System is systematically designed to realize a learning environment and learning procedures that actively develop students' thinking abilities to have spiritual strength and religious morals, discipline, character, intellectual, integrity, and abilities needed for themselves, others, the nation, and the state (Rahman, 2022), (Media et al., 2023), However, education currently has various challenges in the learning process, among others: 1) the use of LKS or reading books in delivering lessons results in students only being listeners in class, 2) the method used by the teacher is only lecturing and not much feedback to students which makes it difficult for students to understand the material learned both textually and contextually, (Manajemen et al., 2023), 3) The use of less varied media causes students to be uninterested in learning and feel bored in participating in learning (Ruli Astuti, 2023), (Ferguson-Patrick, 2020).

These problems can affect students' critical thinking skills so that appropriate learning aids are needed to facilitate learning activities and educators can think creatively and innovatively in delivering learning materials (Wulandari et al., 2023), (Deviya Nur Laily,

2022). It should be emphasized that the good and bad and the success of the learning process is seen from learning activities that are focused on students so that students can be active in it both psychologically, cognitively, and effectively (Prasetyo & Djuanda, 2021), (Wibowo & Mufidah, 2022).

The use of appropriate media can create a positive learning environment by utilizing educational learning support tools (Fauzi, 2022), (Bahak et al., 2021). When students participate in the LBL E-Module, they can develop their logic skills and reasoning power. With good learning media, students can improve their learning quality to achieve the desired learning outcomes (J. I. Pendidikan & Bimbingan, 2019). LBL E-Modules can make it easier for educators to provide material to students with the intention of captivating students' interest, attention, and feelings during learning (Aini et al., 2023) (Moch. Bahak Udin By Arifin, Eni Fariyatul Fahyuni, 2020). E-Module LBL is expected to help students think critically, pay attention, feel emotions and develop the skills they have (Fadilah & Kanya, 2023) (Latifah et al., 2023), (Harmila, 2023). LBL e-Modules not only help children to interact better, but also teach them how to think quickly to find solutions to problems faced (Nurizka & Manik, 2022), (Sales et al., 2019).

The indicator of critical thinking developed in the LBL E-Module is a way of thinking to solve problems and achieve results by implementing opinions on the basis of their rationale (Auniyah et al., 2020). The ability to think critically can foster students in learning, not only that students can also learn to manage other personal skills they have. Critical thinking can also be implemented in learning by using tools that are suitable for the material to help students become active and creative (Zuwariyah et al., 2021). Critical thinking ability consists of several indicators, namely: 1) Orderly and deep thinking in a coherent manner, 2) Ability to solve problems, 3) Able to express ideas or opinions, 4) Able to see problems from various points of view, 5) Able to evaluate the results of problem solving, 6) Ability to make conclusions.

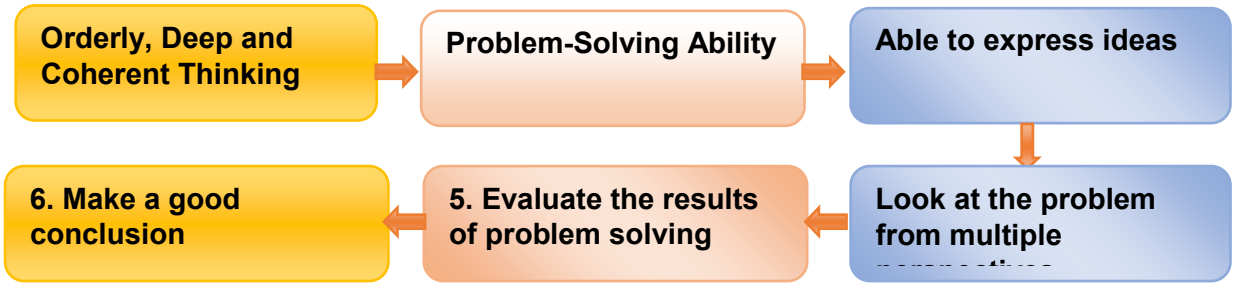


**Figure 1. Critical thinking indicators** (Misdianingsih, 2022; Wahyudi, 2022; Arifiyah, 2023).

Based on this picture, it can be concluded that: 1) The conciseness and depth of student thinking, meaning that students can identify the steps that will be taken to solve the problems they encounter, 2) The ability to express ideas / argumentative, students can express their opinions logically based on reality or knowledge they have, 3) Withdrawal of decisions taken, students are able to make a decision on the problem at hand according to the solution steps (Nurdyansyah & Aini, 2020).

Based on this, it can be conveyed that the urgency of this research is that the LBL E-Module can improve students' critical thinking skills. Students' critical thinking skills will provide greater benefits or positive values for cognitive development and improve student competencies. In addition, when students are able to think critically, learning will be more effective. Researchers focus on making media for learning so that students enjoy learning so researchers choose to make E-Modules based on *life-based learning* as a learning tool.

This research refers to previous research as a basis for novelty in research that discusses learning media in the form of E-Module LBL to improve critical thinking skills. Pratiwi's research has been proven to be able to foster students' critical thinking skills in elementary school children (Pratiwi & Ismaya, 2021). Likewise, Hermansyah's research has categorized that LBL learning can be categorized as effective (Dadar et al., 2022). In addition, researchers also took one relevant research conducted by Permana, the results of which stated that the PAI E-Module could develop students' critical thinking intelligence and could solve a problem (Permana, 2023). The novelty of this research is that the LBL E-Module media can facilitate students' understanding of the material presented and can optimally develop students' critical reasoning power. Students are also involved in a number of activities so that in real terms students can carry out productive activities to stimulate students' critical reasoning power (Tarbiyah et al., 2023). Based on these problems, the purpose of this study is to improve students' critical thinking skills through the development of LBL-based E-Modules (life based learning) so that students can be more effective and enthusiastic during the learning process and students' critical thinking skills can be optimized (Antoro et al., 2023).

## Research Method

This research method used Research and Development (Chamidah & Mintohari, 2020) with the ADDIE model which includes: 1) Analysis, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation which is an acronym for the name ADDIE (Hidayat et al., 2021) (Songo & Vol, 2022). The development steps are as follows:

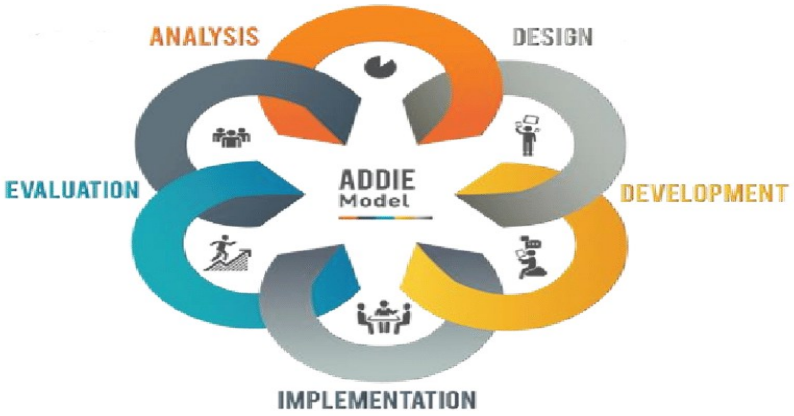


**Figure 2. ADDIE Model Development** (Meilani Safitri, 2022)

The technical explanation related to the implementation of the ADDIE Model is as follows: 1) *Analysis*: At this stage, information obtained from field observations is used by researchers to evaluate the problem, 2) *Design*: In this step, researchers design products based on problems in the field as well as the results of initial observations with related parties. Thus, the product will be designed in accordance with the needs analysis. 3) *Development*: The development stage is the product that has been developed into a physical product. This stage is also used as a validation stage by giving questionnaires to material and media experts. 4) *Implementation*: In this stage, the product is tested on fourth-grade students of MI Penatar Sewu then questionnaires are given to students and teachers to get responses to the tested product. 5) *Evaluation:* The evaluation stage by giving questions before and after the test to get data on whether the LBL E-Module media can foster students' critical thinking skills. In this study, secondary data was used as a data source to solve the problem under study, while the quantitative method used a questionnaire as the primary data source to solve

the problem under study. The research location was MI Penatar Sewu -Sidoarjo. The study involved 22 students from grade 4 of MI Penatar Sewu.

This research data collection technique used: 1) Observation, researchers observed the learning atmosphere and classroom conditions during learning. 2) Questionnaire (questionnaire) is an instrument used in research to combine evidence regarding the answers of learners and educators to assess the feasibility of media by conducting validity tests and effectiveness tests.(Lisnawati et al., 2022). 3) Documentation (how to provide photos/images related to research) is another data collection technique.(Gede & Yasa, 2022).

The data analysis technique of this research uses a T-test using the SPSS 25 application to test the results of media effectiveness. The data collected will be examined through quantitative explanation. Assessment scores from media experts, materials, language, and student responses are needed to process quantitative data. Processing quantitative data uses a Likert Scale with a rating value of 1-4, where the answer choices are very good to very bad (Alzanah & Dewi, 2022). The following is a score criteria table:

a) Validation is carried out to assess the validity of the product through filling out a questionnaire that is done by expert validators in material, media and language; validation is carried out in the form of a questionnaire using a Likert scale:

b) **Table 1. Validity Assessment**

| Qualification | Value |
|---|---|
| Very suitable | 4 |
| as per | 3 |
| Not suitable | 2 |
| Not suitable | 1 |

The score can be calculated using the formula :

$$\text{Percentage} = \frac{\sum \text{skor x bobot komponen}}{n \text{ x skor tertinggi}} \text{ x } 100\%$$

After calculating the score value, the product is categorized as feasible if it meets the following qualifications:

**Table 2. Expert validation eligibility categories**

| Success Rate | Qualification | Clarification |
|---|---|---|
| 81-100 | Very good | No need for improvement |
| 61-80 | Good | Small improvements |
| 41-60 | Simply | medium repair |
| 21-40 | Less | Major improvements |
| 0-20 | Less than Once | Modified |

Source: Riduwan (Riduwan, 2019)

If the product has a value> 61 and has good or very good qualifications according to the results of expert validation, the product is declared feasible. After the improvements were made, the learning media was tested on fourth grade students of MI Penatar Sewu. The questionnaire used a Guttman scale with "Yes or No" as the answer. The T-test will be used to find the standardized values of the pre-test and post-test. The results of this test will show how effective and how much the emodule is in improving students' thinking skills in learning.

## Results and Discussion

### Feasibility of LBL E-Module Learning Media

This research explains the e-Module learning design by presenting the planning stages that have been adopted from the ADDIE model. The results of the feasibility of LBL E-Module learning media by experts are as follows:

**Feasibility Test Results by Material Experts**

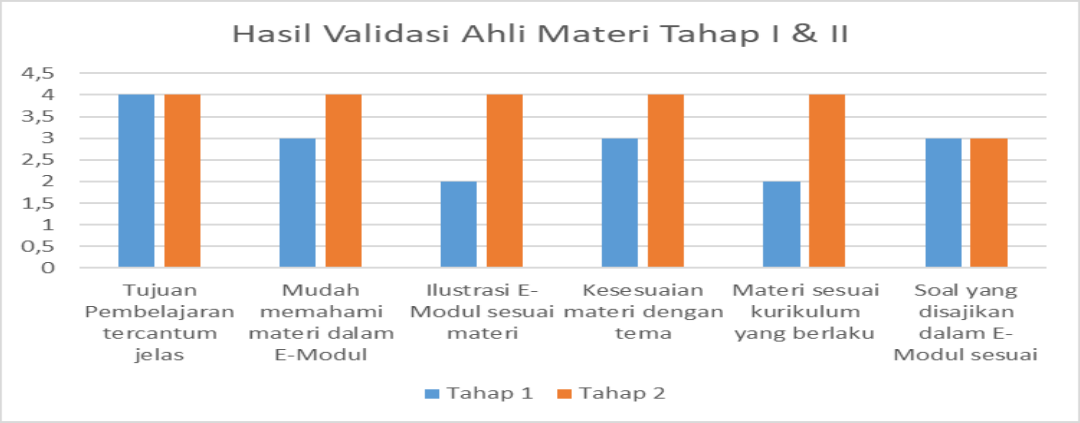


**Figure 3. Material expert validation results**

Based on the data above, the material expert has an overall score at stage I of 70.8%, which indicates that the material in the LBL E-Module is categorized according to the lesson plan. The highest value is in the first indicator, namely the *learning objectives are clearly stated*, while the lowest value given by the material expert on the third and fifth indicators, namely: 1) LBL E-Module illustrations according to the material and 2) *the* material *is in accordance with the applicable curriculum*, so the material expert suggests among others: 1) change illustrations with interesting images, 2) change illustrations / images closer to the context of the material, 3) some material changes are adjusted to the content of the curriculum so that learning objectives are achieved properly.

Referring to Figure 3, the results of the material expert validation at stage II show that the improvements that have been made reaching 95.8% and getting the optimal score (4) or 100% with the category is very suitable and there is no need for improvement. There is only 1 indicator that has not obtained the optimal score, namely the 6th indicator, namely the *questions presented in the E-Module according to* getting a score of 3 or 75% with the appropriate category.

Based on the analysis of the table results, according to Arikunto (2020), (Garrote, 2020) rating scale is a scale that shows the value in the form of numbers against the results of consideration. Respondents choose one of the quantitative answers on the rating scale. The score group is divided into four categories based on a value scale from 1 to 4 (Likert scale). According to the validity assessment criteria given by Arikunto, the percentage of 95.8% in stage II of the material expert test is considered very good for use in learning activities.

**Media Expert Result**

**Table 3. Results of Media Expert Assessment (Phase I and II)**

| No. | Standard | Phase I Value | Legality | Phase II Value | Legality |
|---|---|---|---|---|---|
| 1 | Size suitability of LBL E-Module products | 3 | 75% (appropriate, minor improvements needed) | 4 | 100% (very suitable, no need for improvement) |
| 2 | Has an attractive appearance | 2 | 40% (Less suitable, needs moderate improvement) | 3 | 75% (appropriate, minor improvements needed) |

| | | | | | |
|---|---|---|---|---|---|
| 3 | Clarity of the images presented | 2 | 40% (Less suitable, needs moderate improvement) | 3 | 75% (appropriate, minor improvements needed) |
| 4 | Placement of titles and images does not interfere with understanding | 4 | 100% (very suitable, no need for improvement) | 4 | 100% (very suitable, no need for improvement) |
| 5 | The sentences used are easy to read and understand | 3 | 75% (appropriate, minor improvements needed) | 4 | 100% (very suitable, no need for improvement) |
| 6 | Color elements are clearly visible and attract students' attention | 2 | 40% (Less suitable, needs moderate improvement) | 4 | 100% (very suitable, no need for improvement) |
| 7 | Easy to use media | 3 | 75% (appropriate, minor improvements needed) | 4 | 100% (very suitable, no need for improvement) |
| 8 | Media can increase student activeness | 3 | 75% (appropriate, minor improvements needed) | 4 | 100% (very suitable, no need for improvement) |
| 9 | Use of picture illustrations in accordance with relevant material | 2 | 40% (needs improvement) | 3 | 75% (appropriate, minor improvements needed) |
| 10 | Can help students to remember the material | 3 | 75% (appropriate, minor improvements needed) | 4 | 100% (very suitable, no need for improvement) |
| | **average value** | **2,7** | **67,5%** | **3,7** | **92,5%** |

Based on the data above, media experts have an overall score at stage I of 67.5%, which indicates that the media in the E-Module needs to be revised because the results have not reached the maximum level. This is due to, among others: 1) the appearance of the images presented does not attract students' attention, 2) The clarity of the images is still low, 3) the color design is not appropriate and 4) the illustrations are still not appropriate. Therefore, in the second stage, it is necessary to improve the media according to the media expert's input.
Referring to the table above, the average value of stage I is 2.7 or 67.5% while the average value in Stage II is 3.7 or 92.5%, based on these data there is an increase in media validation results between stages I and II which is 1.0 or 25%. Of the 10 indicators that received very suitable scores, there were 7 indicators, while the other three indicators received appropriate scores. indicators that have not obtained optimal scores are on indicators 2, 3 and 9. as for the results of improvements from the media expert review as in the following table:

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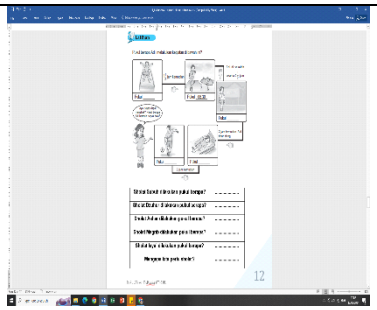
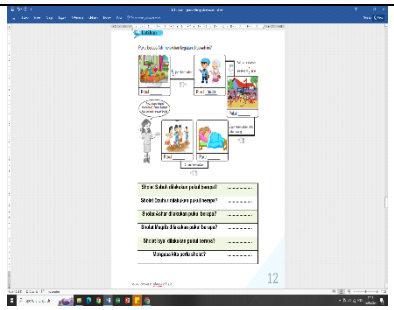
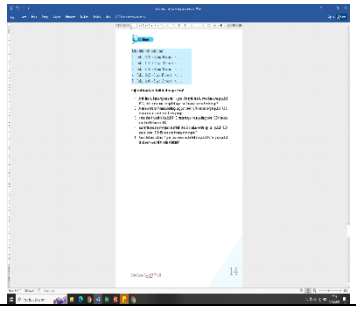
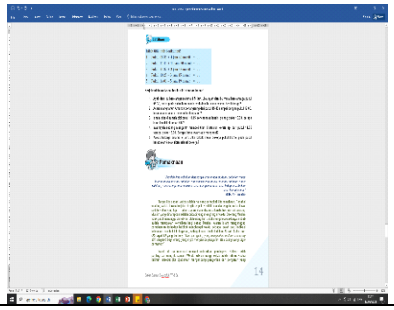
**Table 4. Overview of Media Expert Assessment and Review Data**

| No. | Before Revision | After Revision | Advice |
|---|---|---|---|
| 1. |  |  | From the input of media experts, the colors used for the LBL e-Model should be adjusted so that the colors used are not only black and white but there are mean colors to stimulate students in learning. |
| 2. |  |  | In this object for an E-Module is not only an exercise but because this E-Module is based on Life Based Learning, it needs meaning which is a point of difference from other Modules. |

Based on the data, the percentage value of media expert validity reached an accumulated value of 92.5%, which means that there is no need for further improvement because the attractive appearance and clarity of the images do not interfere with student understanding in the use of the LBL E-Module. The percentage value has also increased from the previous 50% with a moderate revision status to 75% with minor revision status. This shows that the E-Module media is very feasible to use.

In questionnaire analysis, scores are used to collect respondents' responses. According to Akbar (2019), (Mosito et al., 2020) the maximum amount of data for the number of items on the scale is referred to as the unit of analysis which is given a value of four. Therefore, the results of the validity of the media expert from 10 points got a percentage of 92.5%, which shows that the LBL E-Module is categorized as very good and feasible to use in learning.

**Linguist**

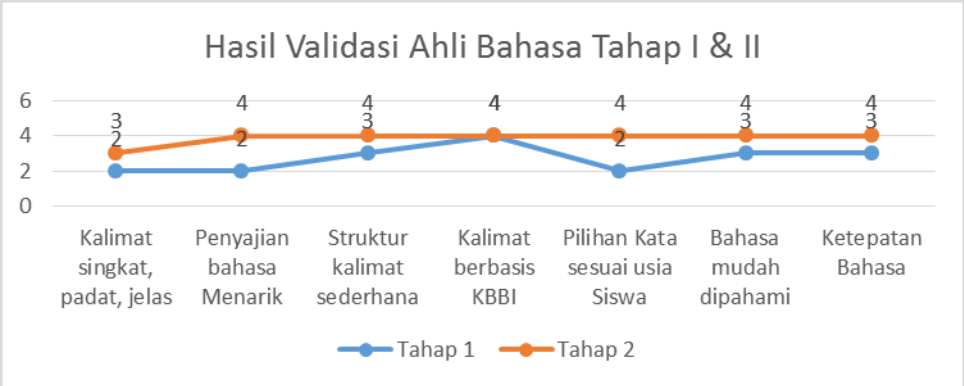



**Figure 4. Results of linguist validity on LBL E-Module media**

In Figure 4 Stage I, it can be seen that the percentage of linguist assessment has an overall value of 67.9%, which indicates that the material in the LBL E-Module is categorized as appropriate and needs revision. The highest scores on stage I indicators are *KBBI-based sentences and easy-to-understand language*, while the lowest scores given by linguists on

indicators 1,2 and 5 are: 1) short, concise, clear sentences, 2) interesting language presentation and 3) *word choice according to the age of the students*, so the linguists suggested among others: 1) the sentences are revised to be effective sentences that are short, concise and clear, 2) change the language pattern to simple language and easy to understand, and 3) as much as possible the selection of words does not need to be difficult but easy to understand and hear students every day in the school environment and at home.

Referring to Figure 4, the results of linguist validation in stage II show that there are improvements that have been made, reaching 96.4% or an increase of 28.6% from before. The optimal value of 100% is obtained by 6 indicators while only 1 indicator does not get the optimal value, namely short, concise, clear sentences. Thus the category obtained by the LBL e-Module from the linguist's side is very suitable and there is no need for improvement. From all the data generated from this analysis, which has been validated by material experts, media experts, and linguists, it can be concluded that using the LBL E-Module media can be continued to the next stage, namely into classroom learning practices.

**Effectiveness of LBL E-Module Learning Media**

**Implementation Stage**

To test the practicality of the LBL e-Module media, it was carried out in a small group test involving 5 students with high, medium, and low academic abilities in fourth grade students of MI Penatar Sewu Sidoarjo. The results of the small group test assessment can be seen in Table 6.

**Table 1.5 Small group product test results**

| No | Assessment Aspect | s1 | s2 | s3 | s4 | s5 | Average | Criteria |
|---|---|---|---|---|---|---|---|---|
| 1. | The appearance of the LBL E-Module is attractive | 4 | 4 | 4 | 4 | 4 | 4 | Very Valid |
| 2. | LBL E-Modules provide motivating learning when read | 4 | 4 | 4 | 4 | 3 | 3,8 | Very Valid |
| 3. | LBL E-Module material is fun | 3 | 4 | 4 | 3 | 4 | 3,6 | Very Valid |
| 4. | The LBL E-Module material is in accordance with the applicable curriculum. | 4 | 4 | 4 | 4 | 4 | 4 | Very Valid |
| 5. | LBL E-Modules based on interactive learning. | 4 | 4 | 4 | 4 | 4 | 4 | Very Valid |
| 6. | Easy to use LBL E-Modules | 4 | 3 | 4 | 4 | 3 | 3,6 | Very Valid |
| 7. | E- Calistung Module helps to understand the lesson. | 4 | 4 | 4 | 4 | 4 | 4 | Very Valid |
| | **Average Total Aspect Score** | **3,9** | **3,9** | **4** | **3,86** | **3,7** | **3,86** | **Very Valid** |
| | **Percentage** | | | | | | **96,43%** | |

Based on table 1.6 about the results of small group product testing by 5 students, the average value is 3.86 with a very valid category**.** There are two lowest indicators, namely the 3rd and 6th indicators which state that the LBL E-Module material needs to be improved to be able to please students and its use needs to be summarized so that it is practical and easily accessible to students. In general, based on table 1.6 above, it identifies that the results of small group evaluations in the category are very valid and practical to use as learning media with a percentage of 96.43%.

**Evaluation Stage**

In order to measure the effectiveness of the E-Module LBL media, an evaluation was carried out on 25 students. The scores showed that a large group of 25 students were tested with the E-Module LBL media, as shown in the following table:

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**Table 1.6 Evaluation Results of LBL E-Modules**

| No. | Criteria | Value | | Clarification |
|---|---|---|---|---|
| | | 1 | 0 | |
| 1 | LBL E-Module media model | 24 | 1 | 96% like |
| 2 | Overall shape of the LBL E-Module | 25 | 0 | 100% like |
| 3 | Size and writing style of LBL E-Modules | 24 | 1 | 96% like |
| 4 | Use of LBL E-Modules | 25 | 0 | 100% like |
| 5 | LBL E-Modules create enthusiasm and motivation in learning | 25 | 0 | 100% like |

Based on the data from the evaluation of E-Modul LBL in table 1.8, it can be explained that 98.4% of E-Modul LBL media are liked / practical to use by students both in terms of form, use and can increase motivation and enthusiasm in learning. The use of this E-Module media makes students more interested and not easily bored in learning. There were only 2 students out of 25 students who answered that they did not like the 1st, and 3rd indicators. Thus it can be concluded that the LBL E-Module is very practical to use in the learning process for students.

The evaluation results as table 1.8 above are in line with the acquisition of pretest and posttest results as shown in figure 1.5 below:

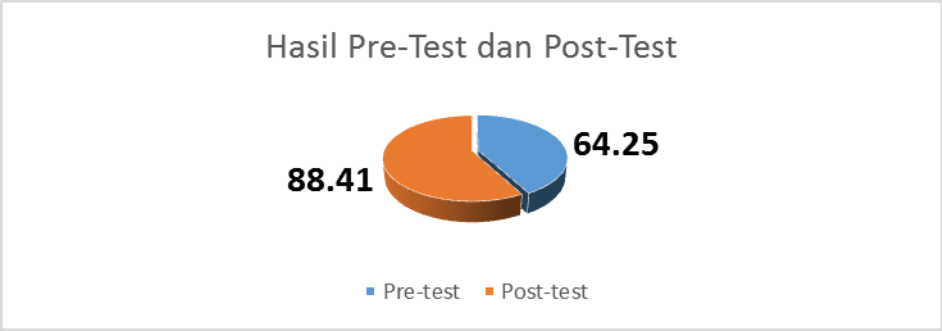


**Figure 5. Pre-test and post-test assessment results**

Based on Figure 1.5 above, the average value of the increase in learning outcomes obtained from the comparison of the pre-test and post-test experienced a significant increase of 24.16 points from 64.25 to 88.41. This means that students experience an increase in learning outcomes in critical thinking skills after using the LBL E-Module. If the above data is percentage, there are 75% of students experiencing an increase in critical thinking skills when referring to the criteria for the success rate of learning that has been determined, it can be concluded that the number of students who experience an increase in critical thinking skills by using the LBL E-Module that has been developed has a success rate of High.

**Pre-test and post – test result (T-Test)**

| | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|
| Pair 1 Pre-Test | 64.25 | 25 | 6.163 | 1.549 |
| Post-Test | 88.41 | 25 | 5.648 | 1.192 |

**Figure 6. Paired Samples Statistics**

| | N | Correlation | Sig. |
|---|---|---|---|
| Pair 1 Pre-Test Post-Test | 25 | .814 | .000 |

**Figure 7. Paired Samples Correlations**

| | Mean | Std. | Std. | Lower | Upper | t | df | Sig.(2- |
|---|---|---|---|---|---|---|---|---|

| | | Deviation | Error Mean | | | | | tailed) |
|---|---|---|---|---|---|---|---|---|
| Pair 1 Pre-test Post-test | -24.164 | 5.849 | 1.247 | -22.852 | -18.880 | -17.060 | 21 | .000 |

**Figure 8. Paired Samples Test**

The acquisition of scores before and after the test can be compared to the standards shown in the table above. The pretest score is 64.25, while the posttest score is 88.41. The p-value of the t-test statistic is 0.00 (less than 0.05), indicating that the null hypothesis (Ho) is rejected and the alternative hypothesis (Ha) is accepted. This suggests a significant impact on the mean values of the pretest and posttest scores (Udin, 2021; Parthenis & Fragoulis, 2020).

Based on these results, the research implies that the application of E-Module LBL media effectively improves students' critical thinking skills and exceeds the KKM value set by the school. The data also demonstrate a significant increase in students' average critical thinking ability after using the E-Module LBL media. Thus, it can be concluded that the E-Module LBL has a significant effect on the average pretest and posttest scores. Furthermore, the use of E-Module LBL media is deemed acceptable and successful in enhancing students' critical thinking skills.

## Conclusion

The feasibility of using the E-Module LBL media is categorized as very feasible based on the expert validity results. Specifically, the material expert's validity score is 95.8% (very valid), the media expert's validity score is 92.5% (very valid), and the language expert's validation score is 96.4% (very valid). These results collectively indicate that the E-Module LBL is ready for field testing. The practicality of the LBL E-Module, based on product trials conducted in small groups, is rated at 98.4%, demonstrating that the module is very interesting and practical for use as a learning media aimed at improving students' critical thinking skills. The effectiveness of the E-Module LBL is supported by the analysis results, which show a pretest mean score of 64.25 and a posttest mean score of 88.41. The t-test p-value of 0.00 (less than 0.05) leads to the rejection of the null hypothesis (Ho) and acceptance of the alternative hypothesis (Ha), indicating a significant effect on students' critical thinking skills due to the application of the E-Module LBL.

## Recommendation

The recommendations from the results of this study are: 1) for teachers who will implement the LBL E-Module must be able to master the material well so that students can be facilitated, 2) for students, the LBL E-Module is a new learning media that requires sufficient accuracy and mastery of technology so that students can learn independently and optimally and 3) for other researchers can conduct development trials with different materials, respondents and places so that the development pattern and effectiveness can be seen.

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