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# Development of Physics Teaching Materials Based on Local Wisdom to Improve Students' Critical Thinking Skills

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**Abstract:** This type of research is Research and Development (R&D). Development is carried out by referring to the 4D model. This study aims to produce local wisdom-based teaching materials to improve students' critical thinking skills that meet valid and practical criteria, analyze the effectiveness of using local wisdom-based teaching materials to improve students' critical thinking skills that have been developed. The results of the study showed that expert research on local wisdom-based teaching materials that had been developed was then analyzed using the Aiken'V formulation, obtained an average aspect of content feasibility of 0.86, presentation feasibility of 0.90, and language aspect of 0.81 and stated that it met the feasibility criteria (valid). The results of the teacher's assessment of the teaching materials obtained aspects of the feasibility of instructions with an average of 3.83, aspects of the coverage of questionnaire components of 3.67, and aspects of language feasibility of 3.44 with a very practical category. So, it can be concluded that this local wisdom-based teaching material is declared feasible to be tested. The effectiveness of local wisdom-based teaching materials can be seen from the increase in students' critical thinking skills based on the results of the pretest and posttest which were analyzed using the N-Gain test. Overall, the average N-Gain value of students in critical thinking skills was 0.55 in the moderate category. So it can be concluded that there is an increase in the critical thinking skills of class XI students of SMAN 14 Bone. This shows that local wisdom-based teaching materials are effective for use in the learning process.

**Keywords:** Critical thinking skills; Local wisdom; Teaching materials

## Introduction

Education is a primary need in human life. Since birth, parents have provided education to their children. After the child grows and develops, learning is given to the child through elementary school, high school and college levels. Education in schools consists of subjects that follow the applicable curriculum. One of these subjects is physics, which is a branch of science. Physics helps improve students' scientific understanding of the universe and the physical phenomena that occur around them. Considering that educational and social aspects cannot be separated because basically good education will determine a prosperous and prosperous social life. This is shown by the presence of the "Independent Learning" curriculum which was initiated directly by the Minister of Education, Culture, Research and Technology of the Republic of Indonesia (Kemendikbud Ristek RI), Nadiem Makarim, where the main concept of independent learning is freedom in thinking. Woods et al. (2024), stated that teachers have the freedom to independently translate the curriculum before it is explained to students so that teachers are able to answer every student's needs during the learning process. Independent learning also involves independent conditions in meeting the objectives, methods, materials and evaluation of learning for both teachers and students. With this, it can be seen that the learning

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process in the independent learning curriculum is more directed at student needs (student-centered) where previously the learning concept was still centered on teachers or educators.

The Independent Learning Curriculum is here as an answer to the tight competition for human resources globally in the 21st century. Ng et al. (2023), stated that there are three major competencies in the 21st century, namely the competence to think, act and live in the world. Thinking competencies include critical thinking, creative thinking, and problem solving. Critical thinking skills are expected to train students to observe situations, ask questions, generate hypotheses, make observations and collect data to draw conclusions. According to Pratama (2020), that through critical thinking skills, a person will be able to place themselves appropriately in various situations experienced. Critical thinking is also necessary so that students think logically and do not easily accept things easily.

Based on the results of the student analysis that has been carried out, it was found that the critical thinking skills of students at SMAN 14 Bone are still relatively low, it can be seen that the limited understanding of students regarding physics material is the main problem faced in the learning process at SMAN 14 Bone. Students have difficulty in developing a deep understanding of physics concepts by relying only on textbooks. This limitation has an impact on student independence in learning. The textbooks used, although providing basic guidance, have not been designed to support independent and participatory learning, which is essential in developing critical thinking skills. Therefore, the role of the teacher is still very dominant in explaining the material, and this is not in line with the principle of student-centered learning desired in the Independent Curriculum.

This condition emphasizes the importance of developing more contextual teaching materials integrated with local wisdom. By linking physics concepts to everyday life and local traditions such as Mappalili, students can more easily understand the material because they learn in a familiar context. The integration of local wisdom in physics teaching materials is expected to make it easier for students to understand physics lesson concepts (Usmeldi & Amini, 2020). Physics learning that is integrated with local wisdom not only provides practical relevance to what they learn, but also provides encouragement to think critically through observation and problem solving related to their daily lives. This connectedness allows students to play a more active role in learning, in line with the principles of the Independent Curriculum which prioritize freedom of thought and creativity. The use of teaching materials in schools has not fully supported efforts to develop students' critical thinking skills. Physics teachers generally use environmental potential as apperception, but rarely link physics material to local wisdom in more depth. As a result, students do not have a real context that is relevant to their daily lives to understand physics concepts critically.

The teaching materials used at SMAN 14 Bone still tend to follow the standard materials in textbooks, which although adequate in terms of scientific accuracy, are less able to motivate students to be actively involved in the learning process. As stated by Haleem et al. (2022), teaching materials should not only be a source of information for teachers and students, but also function as a tool that facilitates an effective, efficient, and systematic teaching and learning process. Quality teaching materials can create an interactive learning atmosphere, where students not only passively receive information, but also actively participate in the learning process through observation, analysis, and in-depth discussion. Good teaching materials do not only depend on objects or examples in books, but must also be able to display real objects and examples that are relevant to students' lives (Darling-Hammond et al., 2020).

In reality, the teaching materials currently in circulation in the form of physics textbooks still have many weaknesses, namely: not compiled based on school objectives; not compiled based on the characteristics and initial abilities of students; not developed based on a number of learning theories; more theoretical; tends to be arranged according to the author's thoughts; tends to be dominated by aspects of knowledge; tends to be presented only based on the subject matter, less based on the cultural values of the local community (Adu et al., 2022). Teaching materials should connect abstract concepts in physics with the environment around students, so that they can understand and apply these concepts in everyday life. Critical thinking skills are one of the important competencies that must be developed in physics learning.

These skills involve high-level cognitive processes such as interpretation, analysis, and inference which play an important role in solving scientific problems. Students with an audiovisual learning style tend to be better at interpreting and analyzing information when supported by teaching materials that use visual illustrations and auditory explanations simultaneously. However, the teaching materials currently used do not sufficiently support this process optimally. One source that can be used by teachers to improve critical thinking skills is through the use of teaching materials. Teaching materials are all forms of materials used in carrying out teaching and learning activities (Li & Li, 2021). Teaching

materials can also be interpreted as materials that must be studied by students as a means of learning. Meanwhile, according to Yusrina et al. (2021), Teaching materials are one of the important tools in learning. Good teaching materials make the teaching and learning process in the classroom more systematic, effective, and efficient.

The teaching materials used will not make teachers only focus on objects or examples that are only in books, but teachers can also display real objects or examples that exist in the environment around the students themselves. This can be obtained through the relationship between the application of physics material and local wisdom. According to Mazid et al. (2024), states that local wisdom is a view of life and knowledge as well as various life strategies in the form of activities carried out by local communities in answering various problems in meeting their needs. To maintain local wisdom, the local government has a great responsibility, not only preparing financial support, but also formulating technical steps to be taken (Masuda et al., 2022). According to Dwivedi et al. (2023), integrating local wisdom in educational and learning activities has great potential to give rise to innovation with novelty.

Integration of local wisdom into education can be done in various forms and purposes, including: local wisdom as a model, which can be an example to be imitated and practiced in everyday life; local wisdom as content that can act as examples that are taught; local wisdom as an inspiration, which gives rise to new ideas in learning. By integrating local wisdom into the module, it is hoped that it will make it easier for students to understand and accept physics lessons. Local wisdom in Bone Regency that can be integrated into teaching materials is the Mappalilii tradition. The physics concepts in this local wisdom include force, speed, acceleration, mass, and momentum. Based on this concept, the material that is in accordance with both local wisdoms is the Dynamics of Particle Motion material in grade XI of high school.

The development of teaching materials based on local wisdom, such as the Mappalili tradition in Bone Regency, offers the potential to bridge this gap. By integrating physics concepts such as force, speed, acceleration, mass, and momentum contained in the Mappalili tradition activities, students will find it easier to understand the material through experiences that are familiar to their lives. This is in accordance with the view of Ramos-Vallecillo et al. (2024) that meaningful learning is that which is directly connected to students' life experiences. Therefore, teaching materials based on local wisdom are expected to improve students' understanding of the Dynamics of Particle Motion material, while encouraging them to think critically in analyzing physical phenomena that occur around them.

The development of local wisdom-based teaching materials requires expert assessment to see the feasibility and validity of the modules that have been developed. According to Shaheen et al. (2023), assessment is a systematic effort carried out through the collection of reliable data or information in an effort to make considerations for decision making. Each expert is asked to assess the product that has been made to find out the advantages and disadvantages of the product that has been designed (Gupta et al., 2023). In addition, according to Schildkamp et al. (2020), Gusti Alfiyanti et al. (2023), and Hanipah et al. (2022), the developed teaching materials can be said to be of quality if the three assessments meet the criteria of valid, practical, and effective. Teaching materials are suitable for use if the teaching materials have been validated by experts or experts, responses by practitioners (teachers) and the effectiveness of the developed teaching materials. Several previous researchers have developed local wisdom-based teaching materials but were carried out on elementary or junior high school students (Gumono et al., 2022). There are also those who have developed teaching materials for high school students and according to their respective regions, namely Kalimantan and Jember (Kamila et al., 2024). They have all developed modules that are suitable for use in learning. However, no one has developed local wisdom-based physics teaching materials in high schools, especially in Bone, South Sulawesi.

Based on the description above, researchers consider it necessary to develop teaching materials that connect the material on particle motion dynamics with local wisdom in the student's environment. To overcome the above problems, the author raised a title "Development of Local Wisdom-Based Teaching Materials to Improve Students' Critical Thinking Skills".

## Method

*Type of Research*

This research is a development researchs. Research and Development is a type of research used to produce teaching material products in outdoor class learning to improve students' critical thinking skills. This research uses the 4D development model, namely define, design, develop, and disseminate (Astarina et al., 2024). This development research was conducted in the Odd Semester of the 2024/2025 academic year at SMAN 14 Bone located in Tellu Siattinge District, Bone Regency.

*Data Analysis*

The data analysis carried out is as follows:

*Validity of Teaching Materials*

Data in the form of validation results of teaching materials based on local wisdom, practitioner assessment questionnaire sheets and learning outcome tests were analyzed by considering input, comments, and suggestions from experts. The analysis used to determine the level of relevance by three experts used the content validity coefficient (Aiken's V). Aiken's V formula is used to calculate the content validity coefficient based on the assessment results of each expert on an item using equation 1.

$$V = \frac{\sum s}{n(c-1)} \quad (1)$$

Aiken test requirements, if V ≥ 0.4 then the expert agreement index is said to be valid.

*Teacher Response Analysis*

Analysis of the practitioner assessment questionnaire on the design of local wisdom-based teaching materials developed using equation 2.

$$PRS = \frac{\sum A}{\sum B} \times 100\% \quad (2)$$

**Table 1.** Practicality Criteria for Teacher Responses

| Percentage Rate (%) | Qualifications | Decision |
|---|---|---|
| 80-100 | Very Practical | The new product is feasible and can be used in the field for learning activities |
| 60-79 | Practical | The product can be continued by adding something lacking with certain considerations, the additions made are not too large and fundamental |
| 50- 59 | Less Practical | Revise by carefully re-examining and looking for product weaknesses to be revised. |
| <50 | Not Practical | Not feasible to use and major revision of the product content |

*Analysis of the Effectiveness of Teaching Materials to Improve Critical Thinking Skills*

To process the scores obtained from students according to Arikunto (2009) can be searched using the formula:

$$PPS = \frac{score\ obtained}{Maximum\ score} \times 100\% \quad (3)$$

To find out the increase in critical thinking skills, use the N-Gain formula, namely:

$$Normalized\ Gain\ (G) = \frac{X_{posttest} - X_{pretest}}{x_{max} - x_{pretest}} \quad (4)$$

**Table 2.** Normalized Gain Criteria

| Normalized Gain Value | Interpretation |
|---|---|
| 0.70 < g ≤ 100 | High |
| 0.30 < g ≤ 0.70 | Medium |
| 0.00 < g ≤ 0.30 | Low |
| g = 0,00 | No Increase |
| -1.00 ≤ g < 0.00 | Decrease |

*Population and Sample*

The subjects of this research trial were students of class XI of SMAN 14 Bone, while for the practitioners, the samples used were three people who were teachers of SMAN 14 Bone in the subject of physics. The design used in the limited trial was one group pre-test and post-test design:

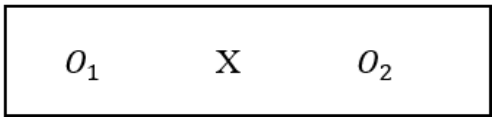


**Figure 1.** Research trial design

Description:

X : Treatment (independent variable)

01 : Pre-test score (before being given teaching materials)

02 : Post-test score (after being given teaching materials)

## Result and Discussion

*Define Stage*

The define stage is defined as the stage of defining or determining the learning requirements. This stage consists of various analyses. Each analysis is useful for determining various objectives and limitations of learning materials. The define stage in this study includes four steps, namely initial analysis, student analysis, concept analysis, learning objective analysis, and local wisdom analysis. The initial analysis was carried out to determine the description of the physics learning process at SMAN 14 Bone, measure students' critical thinking skills, confirm the learning desired by students, and identify the causes of problems that arise in the physics learning process. The analysis of students aims to examine the characteristics of students which include the background knowledge of students, the learning styles of students that are measured. In terms of student learning styles, each student has their own way of understanding physics material. There are three learning styles possessed by students, namely visual, auditory, and kinesthetic.

Based on the results of data analysis, among the three types of learning styles (audio, visual and kinesthetic) 35 students in class XI 6 tend to have an audio-visual learning style, this can be seen based on data analysis, where as many as 48% of students have a

Visual learning style, 45% Auditory, and 7% Kinesthetic. It can be concluded that students in class XI SMAN 14 Bone predominantly have a learning style that tends to process information through sight and hearing because it only has a difference of 3% or 1 student. The audiovisual learning style is a combination of auditory and visual learning styles. Students with this learning style use both learning styles to understand, remember, and process information more effectively.

Concept analysis aims to identify and systematically compile the main concepts that students will learn as reference material for researchers in compiling teaching materials based on local wisdom. The material taken is dynamic motion. The integration of local wisdom elements with the Merdeka flow in physics learning can effectively improve students' critical thinking skills. The analysis of local wisdom aims to identify local wisdom of Bone that can be integrated with Physics learning. The local wisdom of Bone that will be integrated with Physics learning is the Mappalilii tradition (Agricultural tradition in Bone).

*Design Stage*

The design stage is the planning stage for local wisdom-based teaching materials that will be developed. At this stage, the product is designed according to what is needed. This stage is an important stage in research because at this stage local wisdom-based teaching materials will be developed. Product design at this stage cannot be separated from the definition stage.

*Develop Stage*

At this stage, the components of the teaching material content have been created, then printed, and bound so that they become local wisdom-based teaching materials that are ready to use. In addition, instrument development has also been carried out so that a draft instrument is obtained in the form of a practitioner assessment questionnaire instrument, and a test instrument that will be used in the trial stage. The initial design that has been prepared is then validated by experts to determine the feasibility of the teaching materials before a limited trial is carried out. The score obtained from the test analysis of the validity coefficient of the expert agreement index with the Aiken's V index analysis is presented in Table 3.

**Table 3.** Validity Analysis Test of Local Wisdom-Based Teaching Materials

| Aspects | Total Validity Item Score | V | Category |
|---|---|---|---|
| Content Suitability | 17.22 | 0.86 | Valid |
| Presentation Suitability | 6.33 | 0.90 | Valid |
| Language Suitability | 10.56 | 0.81 | Valid |

Based on table 4, it shows that expert validation of teaching materials is suitable for use in the classroom. This is in accordance with the opinion of Petra et al. (2020), who stated that validity refers to the level of adequacy and appropriateness of interpretations made based on assessments. A teaching material is declared valid if the content of the teaching material is in accordance with the target learning competency. Validation of teaching materials according to (Handayani & Putro, 2020), is a process carried out to test the suitability between teaching materials and competencies that are used as learning targets. After revisions were made based on corrections and suggestions from three validators on local wisdom-based teaching materials, the teaching materials were declared suitable for use at the limited trial stage.

**Table 4.** Percentage of Eligibility of Local Wisdom-Based Teaching Materials

| Aspects | Ideal Score | Total Score Obtained | Percentage (%) |
|---|---|---|---|
| Content Suitability | 240 | 215 | 90 |
| Presentation Suitability | 84 | 78 | 93 |
| Language Suitability | 156 | 134 | 86 |

*Disseminate Stage (Dissemination)*

At this stage, distribution was carried out and practitioners' responses were requested using a validated practitioner response questionnaire. The teachers who provided responses were 3 physics teachers at SMAN 14 Bone and the provision of critical thinking test instruments for students.

*Practicality of Teacher Responses*

Teachers' responses to local wisdom-based teaching materials were obtained from a questionnaire of practitioners' assessment of local wisdom-based teaching materials. The results of the scores obtained from 3 teachers who assessed local wisdom-based teaching materials were grouped based on the aspects in Table 5.

**Table 5.** Analysis of Teacher Responses to Teaching Materials

| Aspects | Ideal Score | Total Score Obtained | Percentage (%) |
|---|---|---|---|
| Content Suitability | 84 | 79 | 94 |
| Language Suitability | 36 | 35 | 97 |
| Presentation Suitability | 24 | 23 | 96 |

*Effectiveness of Local Wisdom-Based Teaching Materials*

The effectiveness of local wisdom-based teaching materials can be measured using a critical thinking skills test instrument given to grade XI students of SMAN 14 Bone. The critical thinking skills test was given to

students before (pretest) and (posttest) after learning using local wisdom-based teaching materials. The number of items for each test was 30 items divided into 3 indicators of critical thinking skills, namely interpretation, analysis, and inference. The results of the analysis of students' critical thinking skills tests before being given local wisdom-based teaching materials can be seen in Table 6.

Next, an analysis of students' critical thinking skills was conducted using pretest and posttest data. The results of the critical thinking skills test analysis were conducted before and after being given teaching materials based on local wisdom that were developed. Can be seen in the Table 7.

**Table 6.** Results of Analysis of Students' Critical Thinking Skills Tests

| Parameter | Pretest | Posttest |
|---|---|---|
| Number of Respondents | 35 | 35 |
| Maximum Ideal Score | 30 | 30 |
| Minimum Ideal Score | 0 | 0 |
| Maximum Empirical Score | 13 | 29 |
| Minimum Empirical Score | 4 | 13 |
| Average Score | 7.34 | 22.46 |
| Number of Classes | 6 | 6 |

**Table 7.** Percentage of Pretest and Posttest Scores of Critical Thinking Skill of Class XI Students of SMAN 14 Bone

| Criteria Interval | | Pretest | | Posttest | |
|---|---|---|---|---|---|
| | Category | f | % | f | % |
| $25 < X \leq 30$ | Very high | 0 | 0 | 11 | 31 |
| $19 < X \leq 24$ | Tall | 0 | 0 | 17 | 49 |
| $13 < X \leq 18$ | Currently | 2 | 6 | 7 | 20 |
| $7 < X \leq 12$ | Low | 22 | 63 | 0 | 0 |
| $0 < X \leq 6$ | Very Low | 11 | 31 | 0 | 0 |
| | Amount | 35 | 100 | 35 | 100 |

Based on Table 7 it can be seen that there is an increase in critical thinking skills after the application of local wisdom-based teaching materials. Overall, the average N-Gain value of the pretest and posttest critical thinking skills of students at SMAN 14 Bone has an average of 0.55 and is in the moderate category. Furthermore, to obtain the effectiveness of local wisdom-based teaching materials, an analysis of the increase in students' critical thinking skills was carried out using the equation. The results of the N-Gain analysis can be seen in Table 8.

**Table 8.** N-Gain Score of Critical Thinking Skills of Class XI Students of SMAN 14 Bone

| Criteria Interval | Category | Amount | Percentage (%) |
|---|---|---|---|
| $0.70 < X \leq 100$ | High | 10 | 28.57 |
| $0.30 < X \leq 0.70$ | Medium | 24 | 68.57 |
| $0.00 < X \leq 0.30$ | Low | 1 | 2.86 |
| $g = 0.00$ | No Increase | 0 | 0 |
| $-1.00 < X \leq 0.00$ | There is a Decrease | 0 | 0 |
| | Amount | 35 | 100 |

*Discussion*

*Validity of Local Wisdom-Based Teaching Materials*

The results of the development stage are in the form of local wisdom-based teaching material products that are ready to be used and tested on trial subjects. During the trial stage, practitioner assessments of local wisdom-based teaching materials were also carried out. The trial stage was carried out to determine the practicality of local wisdom-based teaching materials. After this trial stage was carried out, limited product distribution was carried out. Local wisdom-based teaching materials were developed and packaged simply to become one of the references for student learning resources, especially in learning physics on the dynamics of particle motion. The teaching materials developed were arranged based on the needs of students, independent flows based on local wisdom, and based on daily events in the environment around the students.

The local wisdom-based teaching materials that had been developed were then assessed by three experts to measure the validity of the content of the teaching materials. According to the Romero Jeldres et al. (2023), valid means according to the proper method, applicable, authentic. The validity of the product content is carried out by presenting several experts who are experts to assess the product that has been designed. Each expert or specialist is asked to assess the product that has been made to find out the weaknesses and strengths of the product that has been designed (Hellsmark et al., 2016). There are four aspects assessed by the three experts, namely the aspects of content feasibility, presentation feasibility, and language feasibility. If the results of the expert assessment of the four aspects are valid, then the teaching material is declared valid. teaching materials that are declared valid are then revised according to criticism and suggestions from experts, and are ready to be tested. The validation analysis that has been carried out is obtained as in Table 1 which states that teaching materials based on local wisdom are declared feasible to be continued to the trial stage.

*Teacher Responses to Teaching Materials Based on Local Wisdom*

The practitioner assessment questionnaire sheet is an instrument used to obtain teacher responses to teaching materials based on local wisdom. The questionnaire sheet that has been validated and declared valid is then given to the teachers to see their responses to the implementation of teaching materials based on local wisdom. Practitioners in this study were 3 high school physics teachers. The practicality of the local wisdom-based teaching materials developed can be seen from the results of practitioner responses in Table 5. The practitioner assessment questionnaire consisted of 12 statements related to the local wisdom-based teaching materials that had been developed. The results of the practitioner assessment questionnaire analysis concluded that the three practitioners on average gave a very appropriate and appropriate assessment to the local wisdom-based teaching materials that had been developed. The results of this assessment are supported by the direct responses of practitioners when assessing the developed teaching materials. According to (Lestari et al., 2019), a very good level of practicality is assessed from the ease of use, clarity of instructions, and relevance to the needs of students.

*Effectiveness of Local Wisdom-Based Teaching Materials to Improve Students' Critical Thinking Skills*

The effectiveness of local wisdom-based teaching materials can be seen based on the increase in critical thinking skills of students derived from the test results of class XI students of SMAN 14 Bone. The critical thinking skills test was given before and after being given local wisdom-based teaching materials. Nurjaya et al. (2023), stated that the use of teaching materials was effective in improving students' abilities. This effectiveness can be seen from the significant increase in the pretest and posttest scores obtained. The results of the critical thinking skills test before being given local wisdom-based teaching materials showed that no students had very high and high critical thinking skills. There were 2 students in the medium category with a percentage of 6%. In the low category, there were 22 students with a percentage of 63%. While in the very low category, there were 11 students with a percentage of 31%.

Several reasons that might cause critical thinking skills to still be low in students, namely students are less exposed to learning methods that stimulate critical thinking and students are not used to questions or assignments that require them to think critically. This is in line with the research of Sinaga et al. (2023) which states that students have difficulty in understanding information in the form of facts, concepts and complex procedures, and applying knowledge and understanding of concepts to solve problems. This is also in accordance with research conducted by Tambunan et al. (2024), namely the low critical thinking skills of students because educators still do not train students' critical thinking skills. Based on the results of the analysis of the average N-gain score of 0.55 which is in the moderate category, it can be interpreted that local wisdom-based teaching materials are quite effective in learning. There are several factors that influence these results, including students paying less attention when following the learning process and only memorizing formulas without understanding the concept properly.

In line with research conducted by Kamila et al. (2024), and Aristyasari et al. (2023), on the development of science books based on local wisdom to improve students' critical thinking skills, which states that the use of science books based on local wisdom significantly improves critical thinking skills. The approach that integrates local wisdom elements makes learning more relevant and meaningful, so that students appear more active in the learning process. Another study in line with this was conducted by Sarkingobir et al. (2024), and Fiel'ardh et al. (2023), which stated that the ethnoscience-based science module on the material on material classification and its changes was declared effective as indicated by the increase in students' critical thinking skills obtained based on the results of the pretest and posttest using a gain score calculation of 0.62 which is included in the moderate category and the results of the student response questionnaire of 95%. Research conducted by Hikmawati et al. (2021), and Essel et al. (2024), showed that students who used local culture-based teaching materials showed a significant increase in critical thinking skills compared to the control group using conventional teaching materials.

The integration of local culture in physics learning not only improves critical thinking skills but also enriches the learning context with relevant cultural values. These findings underscore the importance of utilizing the potential of local wisdom in developing teaching materials to improve the quality of learning. Based on several research references that are relevant to this study, it can be concluded that the effectiveness of local wisdom-based teaching materials is obtained from the increase in students' critical thinking skills through the N-gain score analysis which has a positive impact on physics learning, especially the material on particle motion dynamics for class XI SMAN 14 Bone. This is shown by the results of the increase in students' critical thinking skills before and after being given local wisdom-based teaching materials. Local wisdom-based teaching materials are interpreted as learning resources that use local culture around the students' environment

as learning objects and observe them directly to obtain data, both independently and in groups.

This is in line with research by Yuendita et al. (2024), and Dewi et al. (2021), that with a local wisdom-based approach, students can more easily understand the material and relate it to the context around them, thereby increasing their interest and understanding of physics subjects. This is in accordance with the research conducted by Matsun et al. (2019), and Wati et al. (2020), that the development of physics modules integrated with local wisdom based on the results of development and trials, it was concluded that the Physics Module integrated with local wisdom of Hulu Sungai Selatan is suitable for use in the learning process. This is supported by the validity of the module content which is categorized as valid and the validation of the display is categorized as very valid, the practicality of the module is categorized as very practical, and the effectiveness of the module is categorized as high (Misbah et al., 2021; Shiyamsyah et al., 2024).

## Conclusion

Based on the results of the research and limited trials that have been conducted, the following conclusions were obtained. The validity of the content of local wisdom-based teaching materials developed based on the results of the Aiken's V content validity coefficient has met the valid category; Practitioner responses to the local wisdom-based teaching materials developed are in the very practical category. This shows that practitioners give a positive response to the local wisdom-based teaching materials developed; The effectiveness of using local wisdom-based teaching materials to improve students' critical thinking skills analyzed by the N-Gain Score is obtained in the moderate category. This shows that there is an increase in the critical thinking skills of class XI students of SMAN 14 Bone and the teaching materials developed are declared effective for use in learning.

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A. M conceptualized the research idea, research method, and analyzed the data. K and P. P guided the writing of the review and editing, supervised and validated the instruments used in the study.

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The author declares no conflict of interest.

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