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Physics Module Based on SETS (Science, Environment, Technology, and Society) and Its Impact on Students' Scientific Literacy

Fiskia Ruzaina[1*], Helmi[1], Muhammad Arsyad[1]

[1]Physics Education, Postgraduate Program, Makassar State University, Makassar, Indonesia.

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Corresponding Author:
Fiskia Ruzaina
fiskia.ruzaina@student.unm.ac.id

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Abstract: This research is a type of Research and Development (R&D) employing the ADDIE model, which consists of five stages: analysis, design, development, implementation, and evaluation. The aim of this research is to develop a SETS-based physics module and to examine its validity, practicality, and effectiveness in improving students' scientific literacy skills. Validation was conducted by three experts who assessed both the module and the scientific literacy test. The practicality of the module was evaluated by eight physics teachers. To determine the effectiveness of the module, a true experimental design was used, specifically the posttest-only control group design, involving two groups: an experimental class (28 students) and a control class (27 students), both from Grade 10 at SMA Muhammadiyah Kalosi. The research findings revealed that: the module was valid and appropriate for use; teacher responses indicated the module was highly practical; and the results of an independent samples t-test showed a t-value of 5.448, which exceeded the t-table value of 2.006 at a 5% significance level. Based on these results, the SETS-based physics module is considered valid, highly practical, and effective in enhancing students' scientific literacy skills.

Keywords: Development; Physics module; Scientific literacy; SETS

Introduction

The 21st century is marked by the rapid development of science and technology, which demands that humans have critical and creative thinking skills, as well as the ability to solve problems (Syaifullah et al., 2024). Education plays a strategic role as a bridge between individuals and their environment, enabling them to adapt and contribute to facing global challenges (Dilekçi & Karatay, 2023). One of the key skills needed in this era is scientific literacy. Individuals with scientific literacy are able to understand and apply scientific concepts and utilize scientific process skills in everyday decision-making (Muzijah et al., 2020).

Scientific literacy encompasses an understanding of scientific concepts and their application in real life (Lestari et al., 2022). Moreover, scientific literacy supports the character development of lifelong learners, including the ability to seek, evaluate, and utilize scientific information for decision-making (Fortus et al., 2022). Scientific literacy has become a primary focus of science education over the past two decades, particularly in developed countries like Finland and Singapore, which have seriously integrated it into their curricula (Ustun et al., 2022).

The urgency of mastering scientific literacy is growing in the context of physics learning (Dhanil & Mufit, 2023). Physics instruction should not merely transmit scientific concepts; it must also guide students

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to relate the material to real-life situations (Mahardika et al., 2023). The current challenge is how to create learning experiences that are relevant, contextual, and encourage the development of critical thinking and problem-solving skills (Lestari et al., 2022). Scientific literacy in physics learning is key to enabling students to understand natural phenomena scientifically and make decisions based on logical reasoning in everyday life (Husna et al., 2022).

Based on observations conducted by researchers at SMA Muhammadiyah Kalosi, information was obtained that the use of innovative and holistic modules is still limited in physics learning. Most of the learning process still relies on standard textbooks, and sometimes teachers simply download modules from the internet. This results in the classroom learning process not providing enough space for the development of students' critical and creative thinking skills. The modules or textbooks used at the school also do not integrate science with environmental and social issues, resulting in students lacking a grasp of the relevance of the physics material they are learning to everyday life. This will indirectly affect students' scientific literacy skills, especially in critical and analytical thinking skills, as well as the application of science in social and environmental contexts they are familiar with.

The use of structured and contextual learning modules can be a solution to improve the quality of learning (Aris et al., 2024). A good module should contain supporting information, assignments, and activities that facilitate active learning (Widarti et al., 2023). Therefore, to produce engaging and meaningful modules, one suitable approach capable of integrating science, technology, the environment, and society is the SETS (Science, Environment, Technology, and Society) approach (Jasmi & Yulkifli, 2024). The SETS approach is considered capable of bridging the link between science and real life, making learning more meaningful and encouraging students to develop higher-order thinking skills (Zulfaniar & Palloan, 2024).

The development of SETS-based physics modules is expected to provide a solution to the low scientific literacy of students in Indonesia. Physics modules incorporating SETS principles will help students develop knowledge and curiosity about the topics/materials being taught, allowing them to explore a wealth of information that can enhance their understanding of physics contextually (Rahmawati et al., 2020). SETS-based modules enable students to engage in more meaningful learning activities, where they can develop critical thinking, problem-solving, and decision-making skills based on scientific data. This also supports efforts to develop 21st-century skills, such as scientific literacy (Wahyuni et al., 2024).

Previous research conducted by Afifah & Bani (2021) showed that learning approaches integrated with real-life contexts, such as the SETS (Science, Environment, Technology, and Society) approach, significantly improve scientific literacy, particularly in conceptual understanding and critical thinking skills. This finding aligns with the research by Adil et al. (2023) which concluded that SETS-based learning has a significant impact on improving students' creative thinking skills. The SETS approach encourages students to understand concepts more meaningfully because they are directly linked to real-life problems. This is of course closely related to the dimensions of scientific literacy, which include the ability to understand scientific concepts, think critically, and make decisions based on scientific evidence in social and environmental life.

Different from previous studies, the novelty of this research lies in the development of a SETS-based physics module specifically designed and implemented in the local context of students at SMA Muhammadiyah Kalosi. This module not only integrates elements of science, environment, technology, and society in general, but is also compiled based on observations and real needs in the field, including the limitations of the modules used so far and the minimal connection of the material to contextual issues. Furthermore, this research not only assesses the validity and practicality of the module but also directly measures the effect of its use on improving students' scientific literacy. The focus on the relationship between local context and strengthening the dimensions of scientific literacy makes this research a new contribution to the development of a physics learning model that is adaptive, contextual, and oriented towards strengthening 21st-century competencies.

Based on the description above, the researcher will develop a SETS (Science, Environment, Technology, and Society)-based physics module and its impact on students' scientific literacy skills. This study aims to analyze the validity of the SETS-based physics module, analyze the module's practicality, and analyze the effect of module use on students' scientific literacy skills.

Method

The research method used in this study is Research and Development (R&D). The ADDIE research model consists of five stages: analysis, design, development, implementation, and evaluation.

Analysis

Initial Needs Analysis

An initial needs analysis was conducted to identify the challenges in physics learning at Muhammadiyah High School in Enrekang. Learning is still teacher-centered, with a heavy reliance on textbooks and teacher explanations. The textbooks used do not support independent learning because the presentation is not contextual, and students have difficulty understanding the material without teacher assistance. As a result, students are less active, less interested in physics, and unable to connect concepts to everyday life, which impacts low scientific literacy. Furthermore, the school's facilities and infrastructure are considered adequate, including classrooms and physics laboratories that can support practical learning. The curriculum used is the Independent Curriculum, which emphasizes the importance of scientific literacy as an essential 21st-century competency, such as critical thinking and evidence-based decision-making. However, its implementation has not been optimal due to the lack of appropriate teaching materials. Therefore, it is necessary to develop a contextual SETS-based physics module that encourages independence and active student involvement in the learning process.

Student Analysis

This analysis aims to identify student characteristics, particularly their learning styles, which include visual, auditory, and kinesthetic. The distribution of learning styles among 10th-grade students at SMA Muhammadiyah Kalosi can be seen in Figure 1.

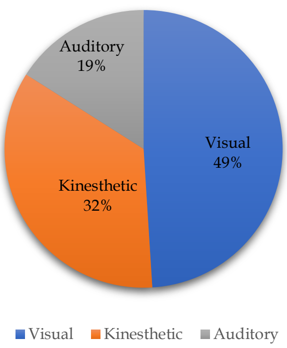

Figure 1. Learning styles of class X students at SMA Muhammadiyah Kalosi

The analysis results show that 10th-grade students at Muhammadiyah Enrekang Senior High School are predominantly visual (49%), followed by kinesthetic (32%) and auditory (19%). This diversity of learning styles is an important consideration in the development of SETS-based physics modules. Modules designed in a visual, applicative, and communicative manner will be more effective in supporting learning because they are able to accommodate students' learning needs and encourage an increase in overall scientific literacy.

Concept Analysis

Concept analysis was conducted to develop and align teaching materials with core competencies and learning objectives, while ensuring their relevance to the SETS approach. The selected materials were Renewable Energy and Climate Change because they are relevant to everyday life and contextualized to enhance students' scientific literacy. The materials were presented not only theoretically but also linked to technological, environmental, and social aspects.

Analysis of Learning Objectives

The analysis of learning objectives is based on the Learning Outcomes (CP) outlined in the curriculum regarding the identified material concepts. The formulated learning objectives serve as a reference in designing and developing SETS-based physics modules based on the selected topics. These learning objectives will also serve as the basis for achieving the desired learning outcomes.

Design

At this stage, all aspects related to the SETS (Science, Environment, Technology, Society)-based physics module need to be carefully planned to improve students' scientific literacy. Each chapter contains material with an integration of SETS aspects as well as learning activities that integrate the SETS approach. The design stages in developing this SETS-based physics module include designing module components, designing module materials/contents, designing module designs, and designing research instruments, namely a practitioner assessment questionnaire and a scientific literacy test for students.

Development

The purpose of this stage is to validate and produce a product in the form of a SETS-based physics module and a scientific literacy test instrument used to see the effect of the SETS-based physics module on students' scientific literacy skills. The SETS-based physics module and the scientific literacy test instrument will be validated by three experts who are postgraduate physics lecturers at Makassar State University. The results of the assessment by the validators will be analyzed using the Aiken V formula which can be seen in the Equation 1.

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

Explanation:

V : rater (validator) agreement index regarding item validation

S : the score set by the rate (validator) minus the lowest score used

n : number of raters (validators)

c : the number of categories selected by the rater (validator)

Based on the V-Table value in Aikens V by looking at the number of validators and the number of categories, the SETS-based physics module is considered valid if the calculated V obtained is $V \geq 0.4$ (Ramadhan et al., 2024). The results of the product feasibility assessment by expert validators are then used as a reference for product improvement or revision before implementation.

Implementation

The developed SETS-based physics products or modules will be assessed for their practicality by practitioners or physics teachers in schools. The practicality test is aimed at the product users, namely subject teachers. The SETS-based physics module practicality test was conducted by eight physics teachers by completing a module practicality questionnaire covering aspects of content suitability, presentation, language, and graphics. The results of the product practicality assessment by the teachers were then analyzed using the Equation 2.

$$\text{Percentage} = \frac{\text{Total score of each item}}{\text{Total ideal (maximum)score}} \times 100\% \qquad (2)$$

Then, the results of the percentage can be grouped into score interpretation criteria according to the Likert scale so that conclusions can be drawn about the responses of teachers and students. The score interpretation criteria according to the Likert scale are as in the Table 1.

Table 1. Practicality categorization

Percentage (%)	Category
$85 \leq P \leq 100$	Very Practical
$70 \leq P < 85$	Practical
$50 \leq P < 70$	Less Practical
$0 \leq P < 50$	Not Practical

(Sugiyono, 2014)

After assessing the practicality of the developed physics module, a trial was conducted. The trial was conducted to determine the effect of using the SETS-based physics module on students' scientific literacy skills. At this stage, the trial was conducted using a True Experiment design with a Posttest Only Control Design model, as shown in the Table 2.

Table 2. Posttest only control design

	Class	Treatment	Posttest
R	Experiment	X	O_1
R	Control	-	O_2

(Sugiyono, 2020)

Explanation:
O_1 : Posttest in the experimental class
O_2 : Posttest in the control class
R : Rambang
X : Use of SETS-based physics modules
- : Use of conventional modules (modules used in schools)

The subjects of the SETS-based physics module implementation trial were 10th-grade students at SMA Muhammadiyah Kalosi, consisting of two classes: an experimental class and a control class. The experimental class was taught using the SETS-based physics module, while the control class was taught using the conventional module. After the learning process, both classes were given a previously validated science literacy test. To determine the effect of the SETS-based physics module on students' scientific literacy skills, the data from the science literacy posttest were analyzed using inferential statistics.

Evaluation

The evaluation stage is used to assess the effectiveness of the developed module and its impact on students' scientific literacy skills. Two types of evaluation are conducted: formative evaluation, conducted at each stage of development, from expert validation to field trials. Formative evaluation aims to improve the module to align with learning objectives; summative evaluation, to see the overall impact of the module. This involves analyzing posttest data or trial data from the SETS-based physics module and its impact on students' scientific literacy skills.

Result and Discussion

This study aims to produce a SETS (Science, Environment, Technology, and Society)-based physics module that is valid and feasible to be used in the learning process and its influence on students' scientific literacy skills. The results of this study are the feasibility of the SETS-based physics module reviewed from the results of expert validation analysis and practitioner assessments as well as the module's influence on improving students' scientific literacy skills which are analyzed through statistical tests on the posttest results between the experimental and control classes.

Results of SETS-Based Physics Module Development

Based on data obtained from a needs analysis conducted in class X of SMA Muhammadiyah Kalosi, a draft of a SETS-based physics module was prepared containing class X physics material, namely Renewable Energy and Climate Change. The printed module was chosen as a form of development because it is more practical to use in the classroom, especially in face-to-face learning activities. The use of printed modules allows students to learn independently and in a directed manner. Research conducted by Ulina (2022) stated that printed modules consisting of several learning activities make it easier for students to learn the contents/material of the module, in addition, teachers expect learning carried out using printed modules to understand the concept of the material and also help students learn independently to think and solve problems.

The use of printed modules is also considered more convenient in the learning process. Printed modules are considered to make it easier for students to take notes, annotate, and understand the material in depth (Puspitasi, 2019). Furthermore, the use of printed media also allows students to learn more independently and in a focused manner due to the lack of digital distractions and the ease of managing their own learning pace (Alfiras & Bojiah, 2020).

Developing a SETS-based physics module begins with determining the module's cover design, which includes the material, the target school level, relevant images, and the author's name. The cover design for the SETS-based physics module can be seen in the image below.

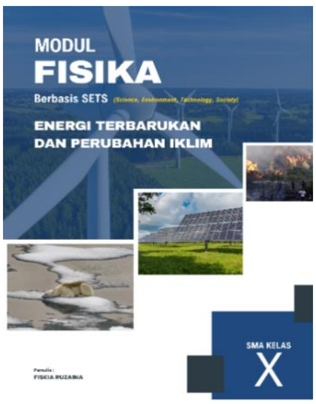

Figure 2. SETS-based physics module cover

The material in the module is structured based on PISA scientific literacy indicators, namely identifying scientific issues/phenomena, explaining phenomena scientifically, and interpreting scientific data/evidence (Zhang et al., 2023). Furthermore, the module is structured based on the SETS approach stages, which include invitation, exploration, recommendation of opinions/solutions, application/follow-up, and concept consolidation (Alatas & Solehat, 2022). The integration of the SETS approach steps and science literacy indicators into the learning activities within the module can be seen in the Figure 3.

Based on the Figure 3, each section of material in the module contains contextual problems based on SETS (Science, Environment, Technology, and Society) aspects. This aims to improve students' scientific literacy skills and relate physics concepts to everyday life. In accordance with research conducted by Lina et al. (2023) the implementation of contextual-based learning activities in the module, such as the use of real-life problems and local culture packaged in the form of learning media, has been proven to improve students' understanding of physics concepts. This also contributes to scientific literacy skills because students are encouraged to relate scientific concepts to everyday phenomena, solve problems, and make decisions based on relevant scientific data and information.

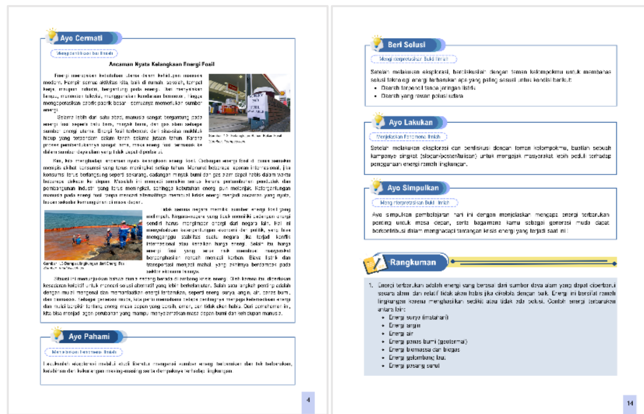

Figure 3. Integration of SETS and science literacy indicators in the module

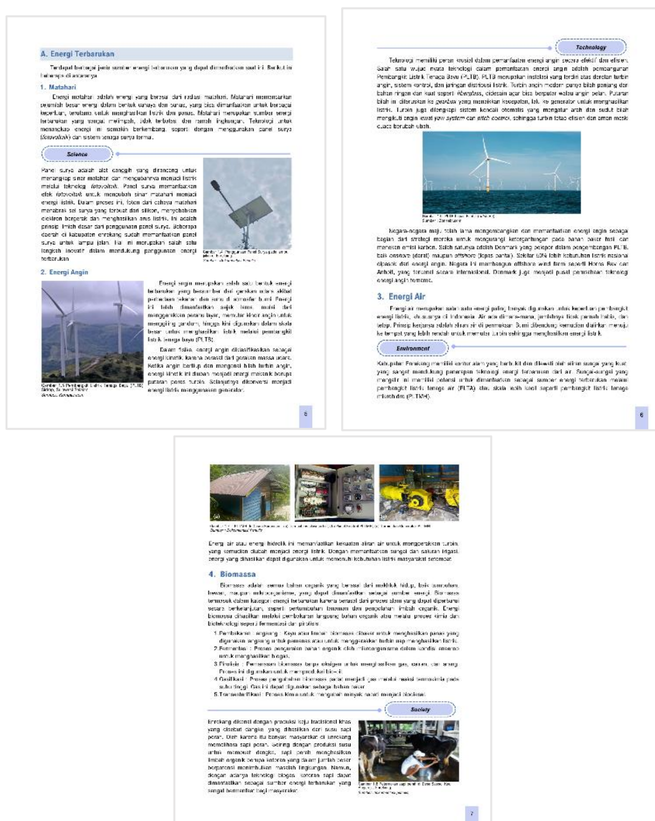

Figure 4. Integration of SETS aspects into the material

Furthermore, the use of illustrations and contextual images from the students' surroundings is one of the advantages of this module, as it can clarify the message and increase students' interest in learning the material. This aligns with research by Shobrina et al. (2020) which states that teaching materials accompanied by contextual images can have a positive influence on students' thinking skills and encourage them to explore more new knowledge related to the material being studied. The integration of SETS aspects into the material in the module can be seen in Figure 4.

After the SETS-based physics module development process was completed, the next step was product validation. The validity of a module is assessed based on its content, presentation language, and graphics (Ridho et al., 2020). The product validation was conducted by three validators, both physics education lecturers, to assess the validity and suitability of the developed product as a teaching material. The validation results for the SETS-based physics module are shown in Table 3.

Table 3. Results of module content validity

Aspects	V	Category
Content	0.71	Valid
Presentation	0.70	Valid
Language	0.69	Valid
Graphics	0.78	Valid
Mean	0.72	Valid

There were several inputs from the three validators at the validation stage, including adjusting the material to the learning outcomes, adding local context or examples that are closer to the students' lives, using less standard or ambiguous sentences to avoid double interpretations, including the source of the images/illustrations in the module, adjusting the spacing and margins and the proportions of the image/illustration placement. The evaluation in the form of suggestions from the validators regarding the product being developed became a reference for product improvements so that when implemented it becomes a product that is suitable for use.

Based on the validation test results by three validators, the developed module meets the valid criteria. The SETS-based physics module is suitable for use. This finding indicates that the module has met the eligibility standards as a learning tool. This indicates that the module is suitable for use in the learning process. This high level of validity reflects that the material presented is appropriate to the needs of physics learning and supports the improvement of students' scientific literacy, as it presents physics material that is directly linked to environmental phenomena, current technology, and its impact on society.

This is in accordance with research by Chanapimuk et al. (2018) which states that the integration of the SETS approach in learning that begins with environmental issues for motivation; exploration; brainstorming, and decision-making to solve problems supports the improvement of students' scientific literacy because it encourages students to think critically, understand concepts in depth, and relate knowledge to real life.

Research conducted by Hardianti et al. (2021) also states that SETS-based modules not only enrich students' understanding of scientific concepts but also help them understand the relationship between science and real-life contexts. This is highly relevant to scientific literacy, which encompasses the competency of understanding scientific concepts and connecting them to real-life social and environmental situations. Therefore, the use of these modules is not only valid in terms of content and design but also has great potential in developing students' scientific thinking skills in the 21st century.

Practitioner Assessment Results of SETS-Based Physics Modules

After product development was completed, the supporting devices and instruments were validated and declared valid. The next step was to conduct a practicality test on the SETS-based physics module. This practicality test aimed to ensure that the teaching materials were truly feasible and could be effectively implemented in the classroom (Ilhamsyah et al., 2022).

The practicality test involved eight physics teachers as potential users of the module. The assessment used a practicality observation sheet, which assessed ease of use, clarity of instructions, integration with learning activities, and the module's appeal to students. The results of the module's practicality test are shown in Table 4.

Table 4. Results of the practicality analysis of SETS-based physics modules

Aspects	Percentage (%)	Category
Content	90.38	Very Practical
Presentation	89.93	Very Practical
Language	89.58	Very Practical
Graphics	91.01	Very Practical
Mean	90.23	Very Practical

Based on the practicality test analysis, the developed SETS-based physics module falls into the highly practical category. This assessment result is also supported by direct feedback from practitioners when assessing the developed module. Practitioners provided numerous responses and suggestions for improving the quality of the SETS-based physics module.

In terms of content feasibility, the learning materials and activities were assessed as varied and contextual, capable of increasing active student participation, and equipped with clear and directed instructions. These findings indicate that the SETS-based physics module developed has met the feasibility aspect of content because it presents varied and contextual learning materials and activities. Material presented with a contextual approach has proven to be more effective in attracting attention and increasing active student participation in the learning process. This is in line with the opinion of Nadhifah et al. (2025) who stated that a good module must be able to direct student learning activities actively and structured through clear instructions and organized activities.

The presentation aspect was considered engaging due to the integration of science, environment, technology, and society, making the material feel more relevant. This finding aligns with the results of Syafutri et al. (2020) who stated that SETS-based interactive physics e-modules improve scientific literacy through a contextual approach and engaging visuals. Research by Sarah et al. (2023) reinforces this finding, with SETS modules integrating local potential increasing engagement and relevance of the material. These three studies provide consistent evidence that the integration of SETS elements in the presentation of material creates a more meaningful, relevant, and motivating learning experience for students.

Furthermore, regarding the language aspect, practitioners suggest simplifying the language to better suit students' understanding levels. This suggestion is consistent with the findings of Schmitt et al. (2022), which show that text readability directly impacts student engagement. If the text is complex or does not meet students' understanding levels, engagement and motivation to learn will decrease. Similarly, research by Zainurrahman et al. (2024) shows that text with low readability hinders comprehension, even when students have a high interest in the topic. Therefore, simplifying the language in physics modules is crucial to ensure that the module content is easily understood and can improve learning effectiveness and students' scientific literacy.

Meanwhile, regarding the graphic aspect, image placement needs to be considered so that it does not disrupt learning focus and still supports the content of the material. Input from practitioners indicates that the graphic aspect of the module still needs adjustment, particularly in terms of image placement. This is important so that the visual display does not distract students from the content, but rather supports visual understanding of concepts. Inappropriate visualization can disrupt the learning flow and reduce learning effectiveness (Lei et al., 2025). This opinion is in line with the results of research by Azka & Surjono (2025) which states that good visual design in a module must consider the balance between aesthetics and educational function to avoid creating excessive cognitive load for students. Images that are too dominant or out of context can actually cause distraction.

Results of the Analysis of the Influence of SETS-Based Physics Modules on Scientific Literacy Skills

After conducting validity and practicality tests, the developed module was then piloted. This aimed to determine whether there was an effect of the SETS-based physics module on students' scientific literacy skills. Therefore, to see the effect, a trial was conducted using a True Experiment design with a Posttest Only Control Design model. This trial was conducted using two classes, an experimental class and a control class. Students in both classes were not given a pretest, but only a posttest after the treatment was given. The experimental class was given treatment in the form of using the SETS-based physics module that was developed, while the control class used conventional teaching materials commonly used by teachers in physics lessons. Furthermore, after the learning process took place, both classes were given a scientific literacy test.

After administering the science literacy test, data on students' science literacy scores were obtained in both the experimental and control classes. The science literacy score data was then processed to determine the effect of the use of the SETS-based physics module on students' science literacy skills. Parametric statistical analysis was performed using the t-test (independent sample t-test). Prior to testing the hypothesis, the data must undergo prerequisite tests, namely normality and homogeneity tests.

The normality test for the data in this study used the Liliefor test. The results of the analysis of the normality test for the scientific literacy scores of students in the experimental and control classes can be seen in Table 5.

Table 5. Result of data normality test analysis

Data	Calculated L-value	Critical L-value	Result
X	0.035	0.172	Normal
O	0.047	0.173	Normal

The results of the Liliefors test showed that the calculated L-value for the experimental class was 0.035, while the L_{table} value at the 5% significance level was 0.172. Since $L_{calculated} < L_{critical}$, the data from the experimental class were normally distributed. A similar result was observed in the control class, with a calculated L_{value} of 0.047 and L_{table} value of 0.173. Therefore, it can be concluded that both datasets are normally distributed and meet the requirements for further parametric testing.

After the normality test was conducted, the next step was to conduct a homogeneity test. The homogeneity test was conducted to determine whether the variance between the experimental and control classes was homogeneous. The homogeneity test was conducted using the F-test. The results of the homogeneity test data for the scientific literacy ability test results of students in the experimental and control classes are shown in Table 6.

Table 6. Results of data homogeneity test analysis

	X	O
Mean	23.428	19.444
Variance	6.994	7.717
Observations	28	27
df	27	26
$F_{calculated}$		1.103
$F_{critical}$		1.1921

Based on Table 6, the variance of the experimental class was 6.994 and the variance of the control class was 7.717, resulting in a calculated F_{value} of 1.103. This calculated F_{value} was then compared with the F_{table} value at a 5% significance level with degrees of freedom df_1 = 27 and df_2 = 26, which was 1.921. Since $F_{calculated} < F_{critical}$, it can be concluded that the two groups have homogeneous variances. Therefore, the homogeneity assumption required for conducting a parametric test (t-test) is fulfilled. The results of the t-test (independent sample t-test) are presented in Table 7.

Table 7. Results of the independent sample t-test

	X	O
Mean	23.428	19.444
Variance	6.994	7.717
Observations	28	27
df		53
$t_{calculated}$		5.448
$t_{critical}$		2.006

Based on Table 7, the average score of the scientific literacy ability test for the experimental class was 23.428 with a variance of 6.994, while the control class obtained an average score of 19.444 with a variance of 7.717. The calculated t_{value} was 5.448. Meanwhile, the t_{table} value at a 5% significance level with degrees of freedom (df = 53) was 2.006. Since $t_{calculated} > t_{critical}$ it can be concluded that there is a significant difference between the scientific literacy test results of the experimental and control classes. The SETS-based physics module has a significant effect on improving students' scientific literacy skills.

The developed module integrates elements of science, environment, technology, and society into each learning activity, encouraging students to think critically, understand concepts deeply, and relate physics to real-life contexts. This is in line with research by Warlinda et al. (2022) which states that the use of SETS-based modules can improve students' scientific literacy through a contextual and meaningful learning approach. Research by Yevira et al. (2023) also states that the use of SETS-based physics modules has been proven to have a positive influence on improving students' scientific literacy. Modules with the SETS approach not only focus on mastering concepts but also link science to real life, thereby improving students' critical thinking skills and scientific literacy.

Furthermore, research by Mashami et al. (2025) and Herlanti et al. (2025) demonstrated that integrating cultural and environmental contexts through a contextual approach based on local wisdom into teaching materials significantly improves students' scientific literacy. These findings support the belief that an approach that links science to the environment and society can strengthen students' conceptual understanding and scientific literacy skills.

Thus, the learning approach through this module has proven to be more effective than conventional learning in developing students' scientific literacy skills.

Conclusion

The SETS-based physics module developed in this research has been validated for use as instructional material in the learning process. This conclusion is based on the results of a validity analysis conducted by three expert validators, yielding a validity score of 0.72, which falls within the valid category. Meanwhile, the practicality analysis of the SETS-based physics module indicated a score of 90.23%, categorized as very practical. Following the validity and practicality tests, a limited trial was conducted to examine the effect of the SETS-based physics module on students' scientific literacy. The results of the limited trial showed that the use of the SETS-based physics module had a significant effect on improving students' scientific literacy compared to instruction without the module. This finding is supported by statistical analysis using a t-test, which revealed that the posttest mean score of the experimental class was significantly higher than that of the control class, with a calculated t-value of 5.448 exceeding the t-table value of 2.006 at the 5% significance level. Therefore, the developed module is deemed appropriate to be used as a contextual teaching material alternative to support the enhancement of students' scientific literacy, particularly in physics topics. For future research, it is recommended that module development not only focus on scientific literacy aspects but also examine its impact on critical thinking, problem-solving, or other 21st-century skills, and be conducted on a broader scale involving various educational levels and diverse school characteristics.

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Conflicts of Interest
Authors declare that there is no conflict of interest.

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