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Research Artikel

SETS-BASED PHYSICS MODULES INTEGRATED WITH LOCAL POTENTIALS TO IMPROVE SCIENCE PROCESS SKILLS

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Abstract
This research aims to produce science, technology, and society (SETS)-based physics modules integrated with local potential to improve science process skills that are valid, practical, and effective. The research method is Research and Development using the Borg & Gall model with 10 (ten) steps. However, this study only carried out steps 1 to 7, namely (1) determining potential and problems, (2) collecting data, (3) compiling product designs, (4) validating, (5) revising, and (6) preliminary research, and (7) analyze the results of preliminary research. The research produced a SETS-based physics module integrated with valid and practical local potential in improving science process skills. The validation scores of material experts and media experts show 77.8% (valid) and 80.6% (valid). Assessment of practitioners, namely physics teachers and high school students showed 91.2% (valid) and 85.4% (valid). The results of the study showed that there were significant differences in the students' science process skills before and after using the SETS-based Physics module integrated with local potential. Students experience an increase in science process skills by 64% with moderate criteria.

Keywords*: module; SETS; local potential; science process skills; valid; practical; effective.*

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INTRODUCTION

Life in the 21st century demands various life skills, one of which is problem-solving (Zubaidah, 2019). The government responded to the importance of problem-solving skills by including these aspects in the standard process (Mahanal, 2014). One way of achieving problem-solving skills is science process skills (Sari, Amilda, & Nawawi, 2018). So, process skills are needed to achieve problem-solving skills.

Science process skills are fundamental skills that facilitate learning in science, enable students to be active, develop a sense of responsibility, and improve learning and research methods (Gürses et al., 2015). High science process skills will increase learning achievement (Adiputra, 2017) and critical thinking skills (Nugraha et al., 2017). The results showed that students' science process skills from elementary school to university levels were still low. The science process skills of elementary school students are in a subordinate category (Rahayu & Anggraeni, 2017), junior high school students are in the medium (Lestari et al., 2020), high school students are in a low category (Novitasari et al., 2017), even university's students in the shallow (Dewi & Muhiri, 2020). Weak science process skills also occur in Wonosobo Regency, Central Java high school students.

Agency released in 2016 shows that the quality of education at the senior high school level has yet to reach the National Education Standard and even tends to be low. In addition, interviews with several physics teachers involved in the Wonosobo district physics forum show that physics learning in senior high schools needs to accommodate the interplay between technology and society. Learning is only concerned with material content. The observation results also show that the material in the textbooks at senior high schools in Wonosobo Regency still needs to link technology and society locally. Therefore, a solution is required to overcome it immediately.

One of the ways to improve science process skills is to use learning facilities in the surrounding natural environment (Aprillia & Asih, 2017). SETS (Science, Environment, Technology, Society) is a learning strategy that accommodates the existence of the natural environment in learning. SETS links the content of science, environment, technology, (Adiputra, 2017) and society. The relationship of four things is closely related to how people use the environment as a science learning facility through appropriate technology to improve society.

The SETS strategy in learning physics is by the characteristics of physics as part of science, which studies material in the world, from structure to behavior (Kirkpatrick & Francis, 2010). Various facts, concepts, principles, laws, postulates, and theories are discovered through physics. Experts use these different physics products to create technology to make people's lives easier. Thus, physics is the forerunner of the development of technology in society. Applying the SETS strategy in physics learning can accommodate the interrelationships between science, environment, technology, and society. The research by (Maghfiroh & Sugianto, 2011) is an example of the application of SETS in learning physics. The SETS design focuses on temperature and heat material physics experiments and presentation. The activity then continued with a discussion about forms of technology and the impact of technology applications on the environment and society. The action ends by concluding.

The implementation of SETS supports efforts to improve science process skills, (Hadiya et al., 2022; Yusra et al., 2021; Wahyudi & Lestari, 2019; Yulita, 2018; Rinsiyah, 2016; Furqan et al., 2016; Ningsih et al., 2015; Susilawati et al., 2016; Adlim et al., 2015; Santi, 2014). These various studies

strengthen the reasons for choosing SETS as a strategy in research to improve science process skills.

The application of SETS is also closely related to local potential, which includes natural resources, human resources, technology, and culture (Hariyadi, 2010). All SETS components are in the local potential element. Both differ in their function. SETS is a learning strategy, while the local potential is in objects used in SETS learning strategies. In addition, the local potential also limits its concept to the unique potential of an area that only exists in certain regions. The application of SETS based on local potential can be interpreted as the use of the local potential of an area as a learning object in learning activities using the SETS strategy so that it can give birth to a deeper meaning for students studying physics.

The results of previous research stated that the integration of local potential in physics learning could improve creative thinking skills (Sarah, et al., 2020) and living values (Sarah & Maryono, 2014). Integrating local potential in SETS-based physics learning will further optimize science process skills. Loading local potential in learning is the main attraction. Students will not only be aware of the uniqueness of their area but will also feel ownership and even be able to generate a desire to develop their regional potential. Research by (Hayati et al., 2019) and (Pamungkas et al., 2017) have proven that integrating local potential in SETS-based science learning can improve science process skills by developing media modules.

There are still few SETS modules integrated with local potential to improve science process skills. Only (Hayati et al., 2019) and (Pamungkas et al., 2017). Each raised local potential in Cilacap, Central Java, and Semboro, Jember. Even though Indonesia has a very high diversity level, it opens up opportunities for the same research with different local potentials.

Wonosobo Regency is one of the regencies in Central Java, with the Dieng Mountains as one of the most prominent icons. Dieng Mountains is one of the mountains which has beautiful natural scenery, distinctive culture (such as shaving dreadlocks), and abundant natural wealth. Even so, the various local potentials that exist have not been explored by the community. Even so, in the scope of physics learning in the education unit of Wonosobo Regency. It is deplorable.

This study aims to produce an integrated SETS-based physics module with local potential in Wonosobo Regency, Central Java, that can improve science process skills in a valid, practical, and effective manner. The local potential includes natural resources in the Dieng Mountains environment, human and cultural resources in the people's way of life, and community farming methods. The integrated technology is the technology of the Geo Dipa steam power plant and the production technology of a variety of typical traditional foods. The physics material of Thermodynamic physics will be integrated with it. This research will produce a module with local potential as a basis and SETS strategy in physics learning that can improve science process skills. Local potential as part of nature, the SETS strategy that integrates environment, technology, and society is very much in line with the characteristics of physics. Therefore, combining local potential in physics learning with the SETS strategy is believed to improve science process skills.

METHOD

This type of research is Research and Development (R&D) using the Borg and Gall design with ten steps, namely (1) determining potential and problems, (2) collecting data, (3) compiling product designs, (4) validating, (5) revising, (6) conducting product testing, (7) revising the initial product, (8) conducting final product testing, (9) revising the final product, (10) and disseminating the product. This study only carried out steps 1 to 7.

The first step is determining potential and problems. This step aims to determine the core problems of learning physics that occur in the scope of secondary education units, especially in Wonosobo Regency, as well as find solutions based on various relevant research results. In this step, the researcher describes the regional potential and learning problems based on multiple studies and the effects of other people's and previous studies. Observation of textbooks at school is the fundamental thing in the study. Thus, this step generates a product idea for a specific purpose.

The second step is collecting data to compile a product that can solve the problem. At this stage, the research seeks to collect various supporting data to create products with specific qualifications that are measurable according to objectives. This step is carried out by reviewing diverse literature to find theories as the basis for product development.

The third step is designing the product. This step aims to design and manufacture products with specific qualifications as a result of development in a tangible form. Stage three produces the initial effect, namely the initial module, by compiling modules according to predetermined principles.

The fourth step is validating material by experts and media experts to get suggestions regarding module content. Assessment of the product by practitioners, namely physics teachers, and students, is also carried out to meet the practical aspects of the modules developed. The validation stage produces assessment results and constructive suggestions to improve the initial product.

The fifth step is to revise the product based on suggestions from material experts, media experts, physics teachers (2 people), and students (4 people) in step four. The results of this stage produce modules that have valid and practical aspects. Next, the module must pass through the sixth stage, namely testing, before using it in physics learning.

The sixth step is in the form of testing the initial product. The students in 10th-grade high school at Takhassus Al Qur'an Wonosobo trial the test to ascertain whether the products that have been declared valid and practical can improve students' science process skills. The test results will be used as material to enhance the module to meet applicable standards effectively.

The 7th step is a revision of the initial product. The results of the module trials by students become material for a more in-depth analysis as well as improvements to focus and ensure that the module effectively improves the science process skills of senior high school students. The results of the module repair in the seventh stage are the final module of the research results.

Material experts, media experts, and practitioners are the parties that assess the quality of the module. Material experts assess the module in presentation, language, and SETS modules. Media experts assess the module from the graphic side, including size, cover design, and content design. The teacher assesses the module in content, presentation, and grammar. Students assess the usefulness, appearance, and effectiveness of the modules.

The research instrument is a test to measure process thinking skills with indicators of observing, interpreting, predicting, applying concepts, planning experiments, and communicating. The test questions are in the form of multiple choice as many as 25 items. Test the validity of the test using SPSS version 22.0 shows that 5 questions are not valid because of the value of $t < t_{table}$. The questions are 3, 7, 11, 16, and 24. Revisions on the 5 (five) invalid items made for later use in data collection.

This study involved 42 participants, including experts, teachers, and students. Two experts in material and media experts test the validity of the product. Two physics teachers test the practicality of the product. Four high school students played a role in conducting practicality tests, and 34 students played a role in testing product effectiveness. All students were determined randomly.

The data analysis technique used quantitative and qualitative analysis. Quantitative data analysis is in the form of a feasibility test based on expert judgment (materials and media) and a module practicality test based on the assessment of practitioners (teachers and students). Qualitative data analysis contains suggestions from material experts, media experts, teachers, and students regarding the product. The expert evaluates the product by filling out the product validation sheet based on the Likert scale, namely Very Good = 4, Good = 3, Poor = 2, and Very Poor = 1. The results of quantitative data analysis are in the form of the average score per aspect and the average item score based on formula 1. Determination of the percentage score per aspect on all items refers to equation 2. Interpret research data referring to Table 1. The module is categorized as good if the average score is at least in the valid criteria for each component based on Table 1.

$$Me = \frac{\sum x_i}{n} \text{..(1)}$$

Information:
Me = Mean
$\sum x_i$ = Amount of data
N = Number of respondents

$$Presentage\ score = \frac{score\ obtained}{total\ score} \times 100\% \text{....(2)}$$

Table 1. Criteria for Product Validity and Revision Levels (Arikunto, 2006)

No.	Persentage	Validation category
1	76-100	Valid (no revision needed)
2	56-75	Sufficiently Valid (no revision needed)
3	40-55	Less Valid (Revised)
4	0-39	Invalid (Revised)

The limited trial used a quasi-experimental method through a one-shot pretest-posttest design. Data analysis using normalized gain test with the determination of criteria <g> 0.7 (high); 0.7 > <g> 0.3 (medium); <g> < 0.3 (low) (Hake, 1998).

RESULT AND DISCUSSION

This study uses 7 (seven) steps, namely (1) determining potential and problems, (2) collecting data, (3) compiling products, (4) validating, (5) revising, (6) conducting initial product trials, and (7) revising the initial product. The following is an explanation of each of these steps.

Step 1. Determinining potential and problems

This step is carried out by extracting information in the form of regional potential and educational problems that occur. The selection of the local potential of Wonosobo Regency was determined based on several considerations, one of which was where the researchers lived so that the researchers understood the field. In addition, the quality of education from the Education Quality Assurance Institute for Central Java Province, high school education in Wonosobo Regency, Central Java Province in 2016 has not yet reached the National Education Standards. Preliminary observations show that the material in the textbooks at senior high schools in Wonosobo Regency has not yet linked technology and society in the local area. Many technologies have developed in the people of Wonosobo Regency, such as PT Geo Dipa Energi, space heating, production technology, and purwaceng coffee serving, and so on (Sarah, 2019). All of them were loaded with physics material in high school, namely SMA Takhassus Al-Quran.

Step 2. Data collection

Data collection is carried out through the study of various references related to the principles of module development to be carried out, including self-instruction, self-contained, stand-alone, adaptive, and user-friendly. Other relevant research was added.

Step 3. Designing the product

Product design activities include the preparation of prototypes of SETS-based physics modules to improve science process skills. The product specifications of this research are (1) A5 size print media (148 x 210 mm); (2) using community science technology in the Wonosobo area as a base; and (3) physics material in the form of Thermodynamics for class XI high school students; and (4) the content section. The contents include (1) a cover, (2) an identity page, (3) a foreword, (4) module usage instructions, (5) an introduction, (6) content standards that contain core competencies, (7) basics competencies, (8) indicators and learning objectives, (9) a table of contents, (10) concept maps, (11) theory, (12) activity, (13) summary, (14) evaluation, (15) glossary, (16) bibliography, (17) and answer key. Presentation of material using the SETS approaches through four stages. They are an introduction, concept formation/development, concept application, and concept consolidation.

The material examines the relationship between science, technology, and society in Wonosobo Regency. The module contents include informing issues or problems related to science, technology, and the people of Wonosobo Regency, exploring students' initial knowledge, presenting material for concept formation, sample questions, practice questions, warnings for consolidating concepts, just info to increase participants' knowledge students, activities to practice science process skills, evaluation questions, and summaries.

The content of the SETS-based science module and local potential was developed to improve science process skills with six indicators, observing, interpreting, predicting, applying concepts, planning experiments, conducting experiments, and communicating. This can be explained as follows.

The content of the module begins with a concept map related to the material. This provides an opportunity for students to develop the first indicator of science process skills, namely observing.

After that, the introduction contains physics material and the connection between the material and local potential. The local potential raised can be in the form of natural conditions and natural phenomena that occur, culture/customs of the community, and technology that has been living in the community as shown in Figure 1.

The description of existing local potential requires students to analyze the application of physics concepts in utilizing existing local potential (technology, customs, natural environment). The analysis concerns what is already running in the community.

Introduction provides an opportunity for students to be able to achieve other indicators of science process skills, namely interpretation and prediction. The ability to interpret is obtained from student activities in explaining the relationship between natural phenomena, culture, technology, related to the science material to be studied. This ability is also accompanied by the ability to predict considering that the introduction not only contains information about the relationship between natural phenomena, culture, technology, related to science material, but also contains a number of questions in the form of certain cases that require students to provide possible things that can occur due to certain conditions. This is in accordance with the indicator of science process skills, namely predicting.


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Wisata Dieng

Sumber: google.com

Gambar 1.1 Para pendaki yang sedang menikmati sunrise di Puncak Sikunir.

Bukit Sikunir adalah bukit kecil fenomenal yang terletak di Kawasan Wisata Dataran Tinggi Dieng dengan ketinggian 2.263 mdpl. Tepatnya sebelah Timur Desa Sembungan, Kecamatan Kejajar, Kabupaten Wonosobo, Jawa Tengah. Desa Sembungan sendiri merupakan desa tertinggi di Pulau Jawa. Bukit Sikunir ini memungkinkan wisatawan lebih leluasa memandang alam Dataran Tinggi Dieng dari ketinggian. Incaran wisatawan di Bukit Sikunir yang paling utama adalah *Golden Sunrise*-nya yang indah seperti yang terlihat pada gambar 1.1. Puncak Sikunir bahkan disebut sebagai tempat strategis mendapatkan *spot sunrise* terindah dan terbaik se-Asia Tenggara.

Rute perjalanan menuju Desa Sembungan cukup dekat dari Alun-alun Kota Wonosobo, sebab hanya memakan waktu sekitar 50 menit menggunakan kendaraan bermotor. Jalur pendakian ke Bukit Sikunir tergolong pendek, dari parkiran sampai pendakian ke Puncak Sikunir hanya berjarak 1 km dan dapat ditempuh dengan waktu 20 sampai 30 menit. Agar dapat menikmati *Golden Sunrise*, para wisatawan harus mendaki di pagi buta saat suhu udara sangat rendah, yaitu antara 10°-15°C dan semakin naik akan semakin dingin. Selain tersedia tempat parkiran untuk kendaraan bermotor, di area kaki Bukit Sikunir juga terdapat musholla, WC umum dan banyak warung-warung yang menjajakan makanan serta minuman khas daerah Wonosobo, terutama Dieng.

2

Pokok Bahasan Termodinamika

Picture 1. The introduction of modul

Learning is then directed to understand physics material in more detail. In this section, various technologies, customs, and natural conditions typical of a region are used as information about the implementation of existing physics material in the form of ideas and experiments to prove concepts using local potential media, such as the stages of serving coffee, studies of steam power plant technology (Geodipa), and others. Various questions and stages of discussion are also included in the module while still raising the local potential of a region.

The teacher introduces science concepts that are closely related to various natural phenomena, culture, and various technologies that have developed in society, and have been presented in the module. This refers to students applying science concepts to explain and answer various things related to natural phenomena, culture, and technology that have developed in society.

In order to deepen students' understanding of the relationship between natural phenomena, culture, and technology that develops in society with science material, several simple experiment designs are also provided. The design accommodates the local potential of the area which is equipped with tools and materials, work steps, and ends with instructions for students to present the results of the experiment in front of their friends. Based on this series of activities, it can be seen that there are efforts to achieve process skills in almost all indicators. However, if examined in more detail, the greatest indicator achievement is in the activity of conducting experiments to communicate.

This module also presents several problems that require students to answer. To do so, students observe, interpret, predict, design and perform to communicate the results of the experiment. This long stage of the task is recommended to be used as a home assignment.

The final part of the module discussion is a summary and evaluation. The summary contains the main points of the material that has been learned. The evaluation contains various questions that demand students' ability to develop science process skills. The evaluation material refers to integrated physics theory utilizing local potential. This is also related to activities that are oriented towards the achievement of science process skills, namely communication. The final part of the module contains the answer key to the questions given.

Step 4. Product validation

The modules tested for validation on aspects of content feasibility, presentation, language assessment, and SETS (Table 2). There are two validator groups, the material experts and media experts. The quality of the module was assessed by physics teachers and high school students in Wonosobo Regency in terms of usefulness, appearance, and effectiveness. There is the result.

Table 2. Results of Material Expert Validation

Aspect	Score mean	% Achievement	Criteria
Content eligibility	2,823	70,6	quite valid

Serving eligibility	3,167	79,2	valid
Language	3,167	79,2	valid
SETS	3,291	82,3	valid
Total mean	3.112	77.8	valid

Based on Table 2, the content feasibility aspect is known to meet a high percentage of 70.6% with quite valid criteria. That is, the module does not need revision. So, the modules that have adequately the aspects of content feasibility with indicators of the suitability of the material with competency standards and basics competencies, material accuracy, supporting learning materials, and up-to-date materials. The feasibility aspect of presenting the material meets 79.2% with valid criteria. That is, the presentation of the material in the module has the feasibility with indicators techniques, presentation support, learning presentation, and completeness. Aspects of language assessment meet 79.2% with valid criteria So, the language in the module is good from many indicators, namely (1) straightforward, (2) communicative, (3) dialogical, (4) interactive, (5) according to the level of student development, (6) meets the elements of an integrated flow of thinking, and (7) fulfill the criteria for using good terms, symbols, or icons. The SETS assessment aspect is 82.3% with valid criteria. So, the module has met the characteristics and principles of SETS. The average assessment by material experts obtained an average score of 3,112 with a percentage of 77.8%. From Table 1, the developed module is valid and suitable for use without revision.

Assessing module validation is also carried out by media experts. The results of media expert validation is 3.224 (score mean) and the percentage of graphics aspect assessment reached 80.6% with valid criteria. The feasibility aspects include module size, cover design, and content design. The module is clarity, legibility of the letters, consistency of the layout, the typography of the book content is simple and easy, easy to understand, and the clarity of the illustrations.

The results of the evaluation of the module by teachers and students are in Table 3.

Table 3. Results of Practitioner Validation

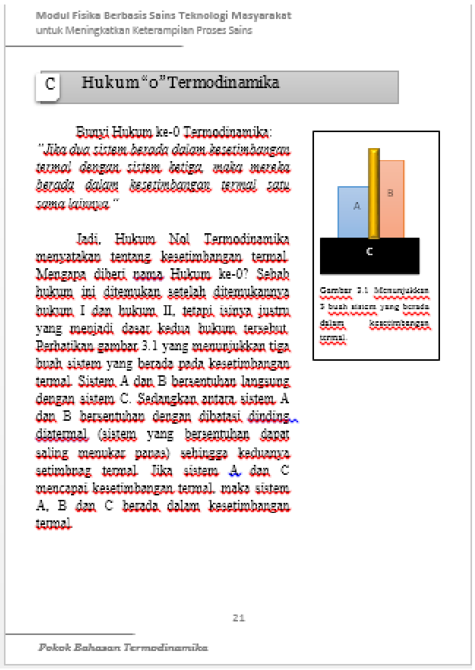
Practitioner	Mean Score	Persentage	Criteria
Teachers	3.650	91.2	Valid
Students	3.417	85.4	Valid

Based on Table 3, the teacher assessed the module 91.2% with valid criteria. Students gave a score of 85.4% for the readability of the module. Thus, the module developed by the researcher fulfills the practical aspect. In addition to quantitative data, teachers and students also provide some suggestions. There are some unclear image prints and symbol writing errors.

Step 5. Product revision

Based on the material and media expert validation test, the module was declared valid and ready to use in research without revision. Learning in SETS with local potential-based approaches has four stages. They are an introduction, concept development, concept application, and concept consolidation. The material examines the connection between science, environment, technology, and society. The module is the content of problems related to science, technology, and the people of Wonosobo Regency. It also explores students' initial knowledge, presents material for concept formation, questions, practice questions, warnings for consolidating concepts, and just info to increase participants' knowledge of students, activities to practice science process skills, evaluation questions, and summaries.

However, there are some suggestions for improving the module. Revisions include: listing the source of the image; completing the material by adding the subchapters of the zero law of Thermodynamics and the 3rd law of thermodynamics clearly even though they are not in the syllabus; sorting learning objectives according to the order of the material; sample questions and exercises must stand alone; the captions on the pictures are in Indonesian; changing the word "analyze" to "explain"; and improve writing a bibliography. Here are some pictures of the revised module sections based on material expert input (Figure 2).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C Hukum "o" Termodinamika

Bunyi Hukum ke-0 Termodinamika:
"Jika dua sistem berada dalam kesetimbangan termal dengan sistem ketiga, maka mereka berada dalam kesetimbangan termal satu sama lainnya."

Jadi, Hukum Nol Termodinamika menyatakan tentang kesetimbangan termal. Mengapa diberi nama Hukum ke-0? Sebab hukum ini ditemukan setelah ditemukannya hukum I dan hukum II, tetapi isinya justru yang menjadi dasar kedua hukum tersebut. Perhatikan gambar 3.1 yang menunjukkan tiga buah sistem yang berada pada kesetimbangan termal. Sistem A dan B bersentuhan langsung dengan sistem C. Sedangkan antara sistem A dan B bersentuhan dengan dibatasi dinding diatermal (sistem yang bersentuhan dapat saling menukar panas) sehingga keduanya setimbang termal. Jika sistem A dan C mencapai kesetimbangan termal, maka sistem A, B dan C berada dalam kesetimbangan termal.

A B C

Gambar 3.1 Menunjukkan 3 buah sistem yang berada dalam kesetimbangan termal.

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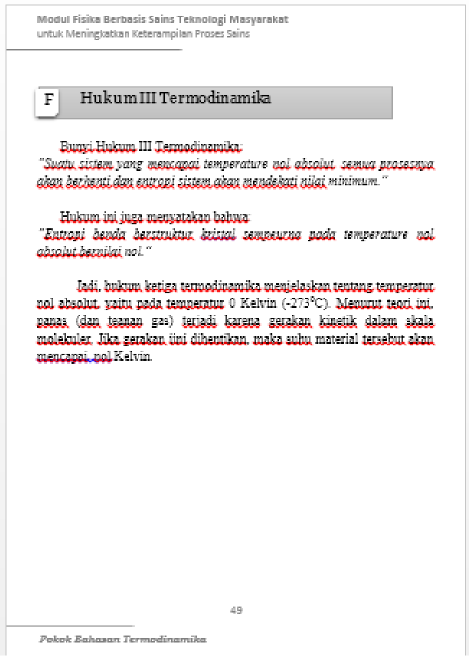
Pokok Bahasan Termodinamika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F Hukum III Termodinamika

Bunyi Hukum III Termodinamika:
"Suatu sistem yang mencapai temperature nol absolut, semua prosesnya akan berhenti dan entropi sistem akan mendekati nilai minimum."

Hukum ini juga menyatakan bahwa:
"Entropi benda berstruktur kristal sempeurna pada temperature nol absolut bernilai nol."

Jadi, hukum ketiga termodinamika menjelaskan tentang temperatur nol absolut, yaitu pada temperatur 0 Kelvin (-273°C). Menurut teori ini, panas (dan tekanan gas) terjadi karena gerakan kinetik dalam skala molekuler. Jika gerakan ini dihentikan, maka suhu material tersebut akan mencapai nol Kelvin.

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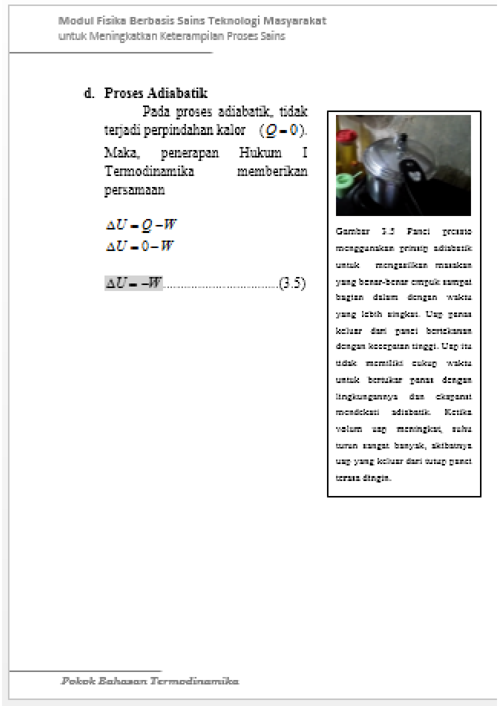
Pokok Bahasan Termodinamika

Figure 2. Addition of the zero and 3rd Laws of Thermodynamics

Based on input from media experts, improvements were made to several parts of the module, namely reducing the blanks on the module page and clarifying the material. Here are some examples (Figure 3).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d. Proses Adiabatik

Pada proses adiabatik, tidak terjadi perpindahan kalor ($Q = 0$). Maka, penerapan Hukum I Termodinamika memberikan persamaan

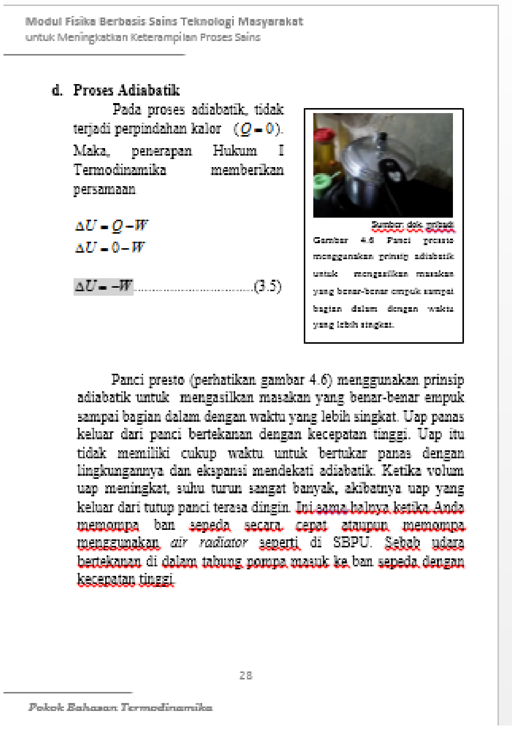
$\Delta U = Q - W$
$\Delta U = 0 - W$

$\Delta U = -W$ ....(3.5)

Gambar 3.5 Panci presto menggunakan prinsip adiabatik untuk mengasilkan masakan yang benar-benar empuk sampai bagian dalam dengan waktu yang lebih singkat. Uap panas keluar dari panci bertekanan dengan kecepatan tinggi. Uap itu tidak memiliki cukup waktu untuk bertukar panas dengan lingkungannya dan ekspansi mendekati adiabatik. Ketika volum uap meningkat, suhu turun sangat banyak, akibatnya uap yang keluar dari tutup panci terasa dingin.

Pokok Bahasan Termodinamika

(a)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d. Proses Adiabatik

Pada proses adiabatik, tidak terjadi perpindahan kalor ($Q = 0$). Maka, penerapan Hukum I Termodinamika memberikan persamaan

$\Delta U = Q - W$
$\Delta U = 0 - W$

$\Delta U = -W$ ....(3.5)

Sumber: dok. pribadi
Gambar 4.6 Panci presto menggunakan prinsip adiabatik untuk mengasilkan masakan yang benar-benar empuk sampai bagian dalam dengan waktu yang lebih singkat.

Panci presto (perhatikan gambar 4.6) menggunakan prinsip adiabatik untuk mengasilkan masakan yang benar-benar empuk sampai bagian dalam dengan waktu yang lebih singkat. Uap panas keluar dari panci bertekanan dengan kecepatan tinggi. Uap itu tidak memiliki cukup waktu untuk bertukar panas dengan lingkungannya dan ekspansi mendekati adiabatik. Ketika volum uap meningkat, suhu turun sangat banyak, akibatnya uap yang keluar dari tutup panci terasa dingin. Ini sama halnya ketika Anda memompa ban sepeda secara cepat ataupun memompa menggunakan *air radiator* seperti di SBPU. Sebab udara bertekanan di dalam tabung pompa masuk ke ban sepeda dengan kecepatan tinggi.

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Pokok Bahasan Termodinamika

(b)

Figure 3. Before (a) and after (b) revision

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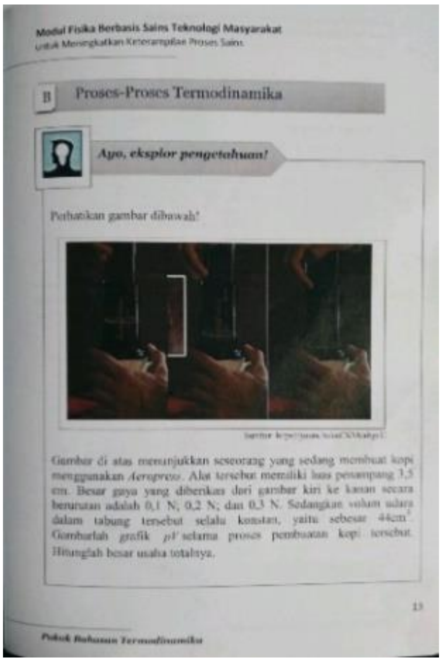
Teachers and students also provide suggestions for module improvements. They are to clarify the print of the image and improve the writing of symbols shown in Figure 4.



(a)

(b)

Figure 4. Before (a) and after (b) revision

Step 6. Limited test

A total of 34 students of class XI SMA Takhassus Al Qur'an conducted a limited test by carrying out physics learning using modules. The research will reveal whether there is an increase in students' science process skills before and after using the SETS-based module integrated with local potential.

Table 4. Description of The Pretest and Posttest Score

No	Data	Pretest	Postest
1	Number of respondents	34	34
2	Mean	35.29	77.06

The data in Table 4 is used to determine whether there is an increase in students' science process skills through the gain test. There is an increase in students' science process skills after using the module of 0.64 with moderate criteria. The results of this study prove previous research, that the science learning module with SETS vision can improve science process skills (Hayati et al., 2019; Prihandono et al., 2017).

Step 7. Limited test revision

Limited test results show that there are no product-related revisions. Thus, the SETS-based physics module integrated with local potential is the final product of this research.

Research shows that the physics module using the SETS approach integrated with local potential in Wonosobo Regency can improve science process skills. This research has not conducted extensive product testing. However, this step is crucial. In the next opportunity, further research needs to be carried out on a large scale to determine the effectiveness of using SETS-based physics modules in improving the science process skills of high school students in the Wonosobo Regency.

This research shows that an integrated SETS-based module with local potential can reach science process skills. The science process skills are one way to achieve problem-solving skills. Therefore, it is possible that this module can improve other skills, such as scientific literacy (Syafutri et al., 2020), improve the values of national character

(Atmojo, 2016), (Sarah et al., 2018), learn motivation (Prastyo, 2020), and others. It is not without reason. The learning step using the SETS approach accommodates these various skills. To ensure this, research related to the achievement of competencies other than science process skills is still very open.

CONCLUSION

This research aims to produce science, technology, and society (SETS)-based physics modules integrated with local potential to improve science process skills that are valid, practical, and effective. The study concluded that the SETS-based physics module met the valid, practical, and effective aspects to improve science process skills. It can be seen from the validation scores of material experts and media experts with valid criteria. The results of the practitioner's assessment: the physics teacher obtained practical criteria; the students reached practice criteria. The gain test results stated that the module improves science process skills effectively in medium criteria. The results of this study can be a reference both from a scientific point of view in the field of physics learning and learning practices to improve the quality of learning that is more meaningful. It is because the use of local potential and the SETS strategy provides an opportunity for a comprehensive understanding of science in terms of scientific material and its relation to technology, society, and the environment.

This research only reaches the stage of producing a product through limited trials. Extensive trials are urgently needed to measure the module's effectiveness more broadly in improving science process skills. It is an opportunity for further research. In addition, the large number of local potentials in each region is an excellent opportunity to develop research on utilizing local possibilities in physics learning.

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