JoTaLP: Journal of Teaching and Learning Physics 11, 1 (2026): 1-7
Website: http://journal.uinsgd.ac.id/index.php/jtlp/index
ISSN 2580-3107 **(online) ISSN** 2528-5505 **(print)**

[Research Article]

ANALYSIS OF THE NEED FOR RENEWABLE ENERGY LEARNING VIDEOS BASED ON PROBLEM-BASED LEARNING (PBL) AT SMA NEGERI 5 LUBUKLINGGAU CITY

Winda Surati[1], Wahyu Arini[2], Yaspin Yolanda[3]
[1,2,3]Department of Physics Education, Faculty of Science and Technology, PGRI Silampari University, Indonesia
Email: windasurati05@gmail.com[1], wahyuarini02@gmail.com[2], yaspinyolanda@unpari.ac.id [3]

DOI: http://dx.doi.org/10.15575/jotalp.v11i1.52677
Received: 9 December 2025 Accepted: 16 December 2025 Published: 28 February 2026

ABSTRACT

This study aims to analyze the need for the development of renewable energy learning videos based on Problem Based Learning (PBL) at SMA Negeri 5 Lubuklinggau. The background of this study is based on the limited use of innovative learning media that can increase student engagement. The research method used is a descriptive qualitative approach through observation, interviews with teachers, and distribution of questionnaires to students. The results show that teachers and students need interactive, contextual learning videos that are suitable for the characteristics of the students. PBL-based renewable energy learning videos are considered capable of helping students understand the material more deeply through the presentation of real problems that are close to their daily lives. The conclusion of this study emphasizes the importance of developing PBL-based renewable energy learning videos as innovative and effective learning support media to improve the quality of the learning process at SMAN 5 Lubuklinggau City.

Keywords: Learning Videos, Renewable Energy, Problem-Based Learning.

How to cite: Surati, W., Arini, W., and Yolanda, Y. (2026). Analysis of the Need for Renewable Energy Learning Videos Based on Problem-Based Learning (PBL) at SMA Negeri 5, Lubuklinggau City, *Journal of Teaching and Learning Physics* ***11*** (1), 1-7. DOI: http://dx.doi.org/10.15575/jotalp.v11i1.52677

1. INTRODUCTION

The development of digital technology has brought significant changes to the field of education, particularly in the provision of more interactive and adaptive learning media. One form of innovation that has been widely developed is instructional video to support both independent learning and classroom activities. However, based on preliminary observations at SMA Negeri 5 Lubuklinggau City, the use of learning media is still limited to lectures and passive video presentations, resulting in less than optimal student engagement. Learning is a combination composed of human elements, facilities, equipment, and procedures that interact and influence one another to achieve the objectives of the learning process itself. The term "learning" can be defined from various perspectives. From a behaviorist point of view, learning is seen as a process of changing students' behavior through the optimization of the environment as a source of learning stimuli.

Developments in the era of globalization and the current quality of civilization are no longer focused solely on the strength of natural resources as a whole, but increasingly require individuals who are capable of developing products or instructional materials as an essential component in the implementation of learning, particularly in the development of learning media (Nadia, A., Ariani, T., & Arini, W., 2020).

Media play a crucial role in the learning process because they are intended to convey information from the source to the recipient and to stimulate students to actively participate in learning activities.

Learning is a systematic activity consisting of interrelated components. These components are not separate; rather, they must function in an organized manner, be interdependent, complementary, and continuous. Learning can also be defined as a process that emphasizes an essential aspect, namely how students actively engage with and study the presented material so that it can be well understood and mastered.

The learning process is the most fundamental activity in the overall educational process, as the success or failure of education depends on how an individual's learning process occurs after completing learning activities. Teaching, on the other hand, is essentially an activity carried out by teachers to convey knowledge to students at school. In essence, the teaching and learning process is a structured arrangement organized by the teacher. Physics is the most fundamental science because it serves as the foundation of all scientific fields that study the components of nature and the interactions within them (Panatakarsa, 2017; Bhakti & Napis, 2018).

Based on the results of interviews conducted with the physics teacher at SMA Negeri 5 Lubuklinggau, several challenges were identified. The teacher has fully implemented the Problem Based Learning (PBL) model and generally understands that this model connects learning with real-life situations. The learning media most frequently used are direct practical tools, while the use of instructional videos is not consistently applied because the teacher believes that not all topics can effectively utilize video media. The instructional videos that are often presented are only simple videos and are not integrated with a specific learning model, particularly the Problem Based Learning (PBL) model.

Based on the results of interviews conducted with six students at SMA Negeri 5 Lubuklinggau, several challenges were identified. Most of the learning media presented by the teacher are sourced from textbooks. The use of video as a learning medium is limited to simple viewing activities and is not integrated with a specific instructional model, such as the Problem Based Learning (PBL) model.

Before being used in the physics learning process, the instructional video to be implemented for students must undergo a feasibility test through validation by experts.

Validation is essential to ensure the accuracy and appropriateness of the product being developed. Based on this, the purpose of the study is to analyze a Problem Based Learning (PBL)-based instructional video for use in physics learning by ensuring that it meets the feasibility criteria in terms of media aspects, material aspects, and language aspects.

2. METHOD

This study is a Research and Development (R&D) study. Research and Development is a research method used to develop and test a product that will subsequently be refined and implemented. The development of the Problem Based Learning (PBL)-based video refers to the 4-D development model (four D model) proposed by Sohilat (2020:194). This model consists of four stages of development: Define, Design, Develop, and Disseminate.

The initial stage of this research is to determine and define the learning requirements. At this stage, an analysis is conducted to establish the learning objectives and the scope of the material to be developed. The design stage aims to create a Problem Based Learning (PBL)-based instructional video that can be used in the learning process. The design stage includes the preparation of research instruments, selection of media, selection of format, and the development of the initial design. The development stage involves validation, product revision, and limited trials of the Problem Based Learning (PBL)-based video. The product that has been revised during the development stage is then implemented with the actual target group on a limited scale, namely one selected class from Grade X at SMA Negeri 5 Lubuklinggau, consisting of 36 students. At this stage, the effectiveness of the developed product is measured.

This research was conducted at SMA Negeri 5 Lubuklinggau City. The sample in this study consisted of Grade X students in the second semester. The aspects evaluated by experts included media aspects, content or material aspects, and the language used in the product.

3. RESULT AND DISCUSSION

Based on the results of the study conducted with the teacher using a renewable energy instructional video based on Problem Based Learning to test the validity of the data, the following results were obtained.

Table 1. Interview with the physics teacher at SMA Negeri 5 Lubuklinggau

Observation Aspect	Notes
Problem Based Learning (PBL)	
Have you ever had experience using the Problem Based Learning (PBL) approach? If yes, please explain.	Almost always implemented in accordance with the PBL syntax.
In your opinion, what learning obstacles or challenges arise when implementing Problem Based Learning (PBL) at this school?	Because it involves discussion activities, time management and student participation become challenges.
In your opinion, how can these learning obstacles or challenges be addressed when implementing Problem Based Learning (PBL) at this school?	Proper time management is essential, and less active students need to be encouraged and stimulated to participate.
What type of assessment is appropriate when implementing Problem Based Learning (PBL)? (e.g., assignments, quizzes, projects, etc.)	Assessment includes cognitive, skills, and affective aspects, depending on the instrument used.
Material	
What is your understanding of Renewable Energy issues?	Biodiesel and solar energy need to be further developed.
Is this issue frequently discussed in your classroom learning?	Yes, it is discussed because in the second semester there are two chapters that address it in depth.
What challenges do you face in teaching Renewable Energy material?	There are no significant challenges.

Table 2. Interview with 36 Grade X students at SMA Negeri 5 Lubuklinggau

Interview Aspect	Notes
Diagnosis of Students' Learning Difficulties	
Do you like physics as a subject? Why?	Yes, because it is interesting.
What difficulties or obstacles do you experience when learning Physics in class?	Formulas.
What type of learning method do you prefer in studying Physics? Why?	Explanation accompanied by examples, because it makes the material easier to understand.
Do you prefer learning through practice or only reading theory?	Practice.
Has your teacher ever assigned you to create a group video and present it in class? Please explain.	Yes, the teacher first explains the material and then assigns a group video project.
When you experience difficulty in understanding physics material, do you usually discuss it with friends or ask your teacher for help? Why?	Ask the teacher, because it is clearer and easier to understand.
Do you experience difficulty in memorizing physics formulas?	Yes.
Do you feel bored with the current teaching methods used by your Physics teacher? Why?	No, because the Physics teacher has interesting ways of explaining the material.
Renewable Energy Material	
Where do you obtain information about Renewable Energy? (e.g., school, internet, television, etc.)	Where do you obtain information about Renewable Energy? (e.g., school, internet, television, etc.)
What do you know about the difference between Renewable Energy and Non-renewable Energy?	What do you know about the difference between Renewable Energy and Non-renewable Energy?
In your opinion, why do we need Renewable Energy?	In your opinion, why do we need Renewable Energy?
What impacts may occur if Non-renewable Energy is used without following environmental principles?	What impacts may occur if Non-renewable Energy is used without following environmental principles?
Do you feel the impact of Renewable Energy in daily life? If yes, give an example.	Do you feel the impact of Renewable Energy in daily life? If yes, give an example.
In your opinion, what are the uses of wind energy, solar energy, geothermal energy, biomass energy, and biofuel in daily life?	In your opinion, what are the uses of wind energy, solar energy, geothermal energy, biomass energy, and biofuel in daily life?

Do you feel that the information you have obtained is sufficient and easy to understand?	Do you feel that the information you have obtained is sufficient and easy to understand?
In your opinion, which method helps you understand renewable energy material more quickly: reading modules, reading books, or watching videos?	In your opinion, which method helps you understand renewable energy material more quickly: reading modules, reading books, or watching videos?

Based on the results of in-depth interviews, it can be concluded that students experience difficulties in understanding renewable energy concepts due to the limited learning media used in the classroom, as learning is still predominantly lecture-based, which reduces active student engagement and makes it difficult for them to visualize physical phenomena spatially. Students show a high interest in interactive digital media, particularly renewable energy instructional videos based on Problem Based Learning, and they expect that physics learning using such videos will help them better understand the concepts. Therefore, these findings indicate the need to develop renewable energy instructional videos based on Problem Based Learning that can provide immersive and interactive learning experiences and are relevant to students' needs in the digital era.

In the current era of globalization and the advancement of civilization, development is no longer focused solely on the strength of natural resources, but increasingly requires individuals who are capable of developing products or essential components in the implementation of learning, particularly through the development of modules. In the current curriculum, creating modules helps students become more active in the learning process by enabling them to discover concepts and answers independently and to formulate problems, whether through experiments, discussions, or practical activities (Ayu, W. R., Ariani, T., & Arini, W., 2019).

The results of the preliminary observation in Table 2 indicate that students' skills in physics learning, particularly on renewable energy material, are still relatively low. Most students are not yet able to identify and understand the core of physics problems. The interview results with students in Table 2 also show that students tend to prefer learning by watching videos rather than reading textbooks and engaging in group discussions. This finding is consistent with Yolanda and Amin (2018), who stated that students often experience surface learning, focusing only on final results without going through an in-depth conceptual analysis process. Furthermore, students' ability to relate concepts to real phenomena is also still low (score 1.8; low category) (Yolanda, 2020). Many students are not yet able to explain the relationship between the Earth's movement and phenomena such as day and night or seasonal changes. This limitation is in line with the findings of Asham et al. (2023) and R. Chen and Wang (2008), which emphasize that physics learning in secondary schools often fails to connect concepts with contextual realities, thereby hindering students' scientific thinking processes.

At the junior high school level, research conducted by Pujiyanto (2018) stated that there is a significant difference in students' physics learning achievement on the topic of work and energy between instruction using video media and instruction without video, with learning achievement tending to fall into the very high category. Research by Puspitasari (2019) further supports the effectiveness of using video in physics learning at the senior high school level, particularly on the topic of work, showing that the use of video can improve students' learning outcomes and encourage active participation in the learning process. The use of video in physics learning is not limited to primary and secondary education but also extends to higher education, as explained in research by Kurniawan (2017), which found that 80% of university students showed interest in video-based learning. Videos help students revisit parts they consider necessary to elaborate on, repeat, or understand more thoroughly (Rismark & Sølvberg, 2019). According to Arsyad (2013), videos can complement students' foundational learning experiences when they read, discuss, practice, and engage in other learning activities.

(2) Videos can accurately depict a process that can be observed repeatedly. (3) Videos can foster attitudes and other affective aspects. (4) Videos containing positive values can stimulate thinking and discussion among student groups, and they can also present events that would be dangerous to observe directly. (5) Videos can be shown to large groups, small groups, heterogeneous groups, or individuals.

4. CONCLUSION

Based on the results of the analysis and discussion above, it can be concluded that physics learning is still dominated by lecture-based methods and memorization activities, with learning media limited to 2D images from textbooks. This condition affects students' understanding of physics concepts, particularly in renewable energy material.

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