

# Analysis of Physics E-LKPD Needs Based on Problem-Based Learning to Improve Students' Critical Thinking Skills

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Received: 30 May 2023; Accepted: 27 June 2023; Published: 29 June 2023

DOI: <https://dx.doi.org/10.29303/jpft.v9i1.5093>

**Abstract -** *The development of ICT and 21st-century learning emphasizes improving students' critical thinking skills. So that the learning process requires teaching materials that can attract students' interest and motivation to learn. This study aims to analyze the need for physics teaching materials for teachers and students at SMP Sriguna Palembang. The teaching material to be developed is an electronic LKPD (E-LKPD) in learning Physics using a quantitative approach with the survey method. The instrument used was a questionnaire containing the needs of E-LKPD teaching materials for teachers and students at SMP Sriguna Palembang, which were distributed via Google Forms. Respondents involved in this study were four teachers and 33 students using a simple random sampling technique. The data obtained were analyzed descriptively in the form of percentages. The results showed that the teachers and students of Sriguna Palembang Middle School needed interactive teaching materials in the form of Problem-Based Learning-based E-LKPD to learn Physics material.*

**Keywords:** *E-LKPD; Problem-Based Learning; Critical thinking skills*

## INTRODUCTION

In the 21st century, technological advancements have influenced all fields, including education (Jayadi et al., 2020). Physics learning is one subject that cannot be separated from technology (Ariyansah et al., 2021). In the teaching and learning process of physics, using technological learning resources is necessary as a tool for the learning process (Pratiwi et al., 2020).

The learning process's most important aspect is the learning resources and the teacher's role in creating innovative teaching materials, learning media, or activities that encourage students to generate knowledge and think critically (Molan et al., 2019).

However, one of the problems in education is the lack of innovation among teachers in creating teaching materials, learning media, or activities that promote students' knowledge generation and critical thinking (Ariani & Meutiawati, 2020).

This issue also occurs at SMP Sriguna Palembang. According to observations

conducted by Tania (2019), the learning process at SMP Sriguna Palembang only utilizes a whiteboard and markers without any additional supporting media, which makes students less interested in engaging in learning activities. It has caught the author's attention to conduct a needs analysis at SMP Sriguna Palembang regarding science learning. The lack of teacher innovation affects the quality of education; thus, developing teaching materials in the form of LKPD (Ariani & Meutiawati, 2020) is needed.

Student Worksheets (LKPD) support and facilitate learning activities to create effective interaction between students and teachers (Umbaryati, 2016). Therefore, the role of LKPD in the educational process is to provide students with opportunities for active learning and engaging learning experiences that can enhance students' knowledge of science and motivate them in the learning process.

Printed worksheets are ineffective and practical (Lathifah et al., 2021). Therefore, transforming printed worksheets into interactive worksheets can make the material more engaging and dynamic and enhance students' motivation and creativity (Lathifah et al., 2021). It is also supported by Melinia et al. (2021), who argue that software that can be accessed through mobile phones (smartphones) is needed to make learning more interesting and effective.

E-LKPD refers to electronically distributed teaching materials that are virtual, portable, affordable, and can be accessed directly from laptops, phones, and other mobile devices (Sa'diah et al., 2022). E-LKPD includes several interactive features such as audio, images, videos, and links that facilitate interaction between students and teachers (Sa'diah et al., 2022). The advantage of E-LKPD is that it can make students interested in learning. Interactive E-LKPD can also facilitate teachers in guiding students as they explore concepts through experiments or investigations (Apriliyani & Mulyatna, 2021).

Education in the 21st century also demands various skills that students need to master, so education is expected to prepare students to acquire these skills to become successful individuals in their lives. Critical thinking is one of the skills that need to be mastered (Jayadi et al., 2020).

Critical thinking is considered a key skill that directly influences academic and professional success. It is also supported by Fransiska et al. (2021), who argue that in 21st-century learning, students are expected to have critical thinking skills. However, most schools' curriculum emphasizes low-level thinking (Bassham et al., 2011). According to Marlina et al. (2021), teachers use critical thinking-based learning media to enhance students' skills.

According to Husein et al. (2015), problem-based learning is essentially a critical thinking skill. Marlina & Sriyanti (2020) add that one essence of critical thinking skills is the problem-solving process through the scientific method. A suitable learning model for promoting students' critical thinking skills is Problem-Based Learning (PBL), and E-LKPD is one of the teaching materials used.

Based on the above description, this research aims to analyze the need for teaching materials in the form of E-LKPD that can enhance students' critical thinking skills at SMP Sriguna Palembang with the required learning pattern. Previous researchers have conducted the needs analysis for E-LKPD. One relevant study by Nababan & Putri (2022) addresses the lack of suitable E-LKPD for online learning during the Covid-19 pandemic. Thus, there is a need to develop E-LKPD that aligns with the Covid-19 emergency curriculum and can enhance students' critical thinking skills through inquiry or problem-based learning models.

Therefore, it is necessary to conduct literature research and field research as the initial stages of the study. The purpose of the field research is to describe the teaching situation at the target school, while the purpose of the literature study is to collect data and understand what teachers do in the learning process.

## RESEARCH METHODS

This study was conducted using a quantitative approach with a survey research method. It serves as a preliminary study in development research. The development involves the creation of electronic teaching materials in the form of Learning Worksheets (E-LKPD) for Physics learning. The development of E-LKPD aims to assist teachers and students in the physics learning

process and serve as an additional learning resource alongside the school's published textbooks. The instrument used in this study was a questionnaire. The questionnaire, distributed through Google Forms, consisted of the needs for E-LKPD among teachers and students at SMP Sriguna Palembang. The respondents involved in this study were four teachers and 33 students from SMP Sriguna Palembang. The data collection technique involved filling out the questionnaire through the Google Forms platform and was obtained using simple random sampling. The data analysis was descriptive in the form of percentages. The percentage was calculated based on the frequency of each selected answer divided by the total number of respondents.

## RESULTS AND DISCUSSION

The preliminary study results include the literature review and field study findings. The literature review findings were obtained from various books and internet sources and studied relevant research findings. The field study revealed that many science teachers at SMP Sriguna Palembang have never developed or used E-LKPD in teaching science, especially Physics. The commonly used learning media are printed books and worksheets from publishers. Additionally, the limited availability of instructional devices in schools constrains teachers during the teaching process. The questionnaire results administered to teachers and students include the following learning needs analysis.

### Analysis of Introducing E-LKPD at School

Table 1 shows that 100% of teachers are aware of E-LKPD, but 100% have never implemented or created E-LKPD in the teaching process at school. The reason for this is the time constraints faced by teachers.

The commonly used teaching materials in the teaching process come from printed worksheets publishers provide. Students also have limited knowledge about E-LKPD, with only 18.2% being aware of E-LKPD, and 100% of them have never studied or used E-LKPD at school.

**Table 1.** The Analysis of Introducing E-LKPD at School

Variable	Category	n (%)
• Teacher		
1. Knowledge about E-LKPD	Yes	4 (100)
	No	0 (0)
2. Application and creation of E-LKPD	Already	0 (0)
	Not Yet	4 (100)
3. The need for E-LKPD to support students' learning	Yes	4 (100)
	No	0 (0)
• Student		
1. Knowledge about E-LKPD	Yes	6 (18,2)
	Have heard	9 (27,3)
	Do not know	18 (54.5)
2. Application of E-LKPD	Never before	33 (100)
	Rarely	0 (0)
	Have	0 (0)
	experienced	

The need for using E-LKPD is 100% required by teachers and students to facilitate their understanding and mastery of the subject matter. It is also supported by Nababan & Putri (2022), where using E-LKPD is highly practical when utilizing electronic devices such as smartphones and laptops. The limited understanding of E-LKPD is due to the fact that teachers and students have not extensively used or accessed E-LKPD for learning activities.

Table 1 shows that while teachers are aware of E-LKPD, they have never created them due to time constraints and limited skills in developing E-LKPD. However, E-LKPD would benefit the teaching and learning process as it offers great practicality.

### Learning Model at School

Table 2 shows that 100% of teachers use the Discovery Learning model in the teaching process at school, and 75% of teachers sometimes use the Problem-Based Learning (PBL) model. According to Astutik & Hariyani (2021), in the 21st century, teachers are expected to provide interactive learning in problem-solving situations.

**Table 2.** Analysis of teachers' needs for instructional models in schools.

Variable	Category	n (%)
1. The frequently used instructional models	PBL	0 (0)
	PjBL	0 (0)
	Discovery Learning	4 (100)
	Inquiry	0 (0)
2. The need for interactive instructional models in problem-solving	Yes	4 (100)
	No	0 (0)
3. Knowledge about Problem-Based Learning (PBL)	Yes	4 (0)
	No	0 (0)
4. Implementation of PBL in teaching and learning	Often	0 (0)
	Sometimes	3 (75)
	Never	1 (25)

The goal is to motivate students to actively participate in learning activities and enhance their critical thinking skills. Therefore, teachers greatly need an interactive instructional model for problem-solving. The appropriate instructional model that provides interactive learning and enhances students' critical thinking skills is the Problem-Based Learning (PBL) model (Purwanto et al., 2016).

### Difficult subjects to learn in school

Table 3 shows that 61.5% of students chose the subject matter of light and optical instruments. The reasons for selecting this subject matter are that it is difficult to understand, there are too many mathematical

formulas, the learning tends to focus on assignments, and real-life examples do not accompany the explanations.

**Table 3.** Analysis of difficult subjects for students to learn in school

Variable	Category	n (%)
1. The most difficult subject matter	The pressure of substances and its application in daily life.	7 (18)
	Waves and its application in daily life	8 (20,5)
	Light and Optics	24 (61,5)
2. Reasons for choosing that subject matter	-Lack of understanding of the concept	19 (57,6)
	-Learning activities tend to focus on assignments rather than conceptual understanding	12 (36,4)
	-Insufficient examples provided to demonstrate the application of pressure in real-life situations.	11 (33,3)
	-Excessive mathematical formulas without proper explanation.	20 (60,6)
	-Lack of engaging explanations to make the subject matter more interesting.	8 (24,2)

The data in Table 3 are consistent with the research conducted by Zainab (2021), which states that light and optics are difficult for 8th-grade students in MTsN to comprehend. Waruwu et al. (2022) also added that the subject matter of light and optical instruments is challenging for 8th-grade students in terms of calculations due to the abundance of formulas, and the learning approach mainly involves memorizing formulas without understanding their meaning.

### The Desired Development of E-LKPD by Students

Table 4 shows that students' desired content of E-LKPD includes several criteria, such as containing images, videos, and text. These desired criteria are based on the subject matter to be learned. Students' desired appearance of E-LKPD to facilitate the learning process includes having an attractive and engaging design, a simple and easily understandable layout, and comprehensive materials accompanied by sample questions.

**Table 4.** Analysis of the desired development of E-LKPD by students

Variable	Category	n (%)
1. The E-LKPD to be developed	-Contains a lot of text	19 (57,6)
	-Contains a lot of images	26 (78,8)
	-Contains a lot of audio	5 (15,2)
	-Contains a lot of videos	23 (69,7)
	-The Other	0 (0)
2. E-LKPD facilitates the learning process	-It has an attractive and engaging appearance	27 (81,8)
	- Has a simple and easy-to-understand interface	19(57,6)
	- Provides complete content along with sample questions	18(54,5)
	-The Other	0 (0)

This data is consistent with the research by Syafitri & Tressyalina (2020), which states that the advantages of E-LKPD are that it can facilitate and narrow down space and time, making learning more effective. E-LKPD also becomes an engaging tool when students' interest in learning decreases.

### Facilities and Infrastructure at School

Table 5 shows that 100% of teachers allow students to bring communication devices (smartphones, tablets, and laptops) to access learning materials in the learning process. However, 100% of students do not have free Wi-Fi access to operate these devices in school. Furthermore, all students (100%) can access E-LKPD in school using smartphones. Based on this data, using E-LKPD for learning is highly feasible.

**Table 5.** Analysis of facilities and infrastructure at the school

Variable	Category	n (%)
1. Allowing students to bring communication devices (smartphones, tablets, laptops, etc.)	Yes	4 (100)
	No	0 (0)
2. Free Wi-Fi facilities at school	Yes	0 (0)
	No	4 (100)
3. Allowing students to use communication devices to access learning materials	Yes	4 (100)
	No	0 (0)
4. Access to E-LKPD at school	Smartphone	4(100)
	Tablet	0 (0)
	Computer	0 (0)

According to Pribadi et al. (2021), all learning activities require electronic devices to support and facilitate human learning, and the availability of technological access also affects the improvement of students' knowledge.

### CONCLUSION

Based on the research results of the needs analysis, it can be concluded that the required teaching materials for teachers and students at SMP Sriguna Palembang are not available in the learning process. Most students have difficulty understanding the material and lack interactive learning provided by teachers, especially in the topic of light and optical instruments. One of the

teaching materials that can help address these issues is E-LKPD, which can make learning activities more engaging and effective. In addition to the required E-LKPD teaching materials, selecting a teaching model that can enhance students' critical thinking skills is essential, such as the Problem-Based Learning (PBL) model, which aligns with the demands of the 21st century. Therefore, further research is needed on developing interactive teaching materials in the form of E-LKPD based on Problem-Based Learning in the teaching process of Physics, particularly for the topic of light and optical instruments, at SMP Sriguna Palembang.

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