

The Needs Analysis of the Electronic Student Worksheets (e-LKPD) Based on Discovery Learning for the Topic of Traveling Waves in High School

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Abstract - This research is research on developing the ADDIE model at the analysis stage. A needs analysis is needed to identify the character profile of learners. This research was conducted at SMA Sriguna Palembang with correspondence of 36 students. The questionnaire of needs analysis questions in this study was disseminated through the Google form platform. The teaching materials developed are in the form of e-LKPD. The analysis results of using other learning resources, such as e-LKPD, as many as 58.3% are still hesitant to use it. Walking wave material raised in this study showed that 55.6% agreed that the material was difficult. The learning model used by the Discovery Learning model. The results of the analysis of the application of discovery learning in physics learning, as many as 44.4% are still hesitant to make observations or experiments on physics material, as many as 50% are still hesitant to analyze the results of observations or experiments, as many as 63.9% are still hesitant to find new things from the results of observations or experiments that have been done. The development of e-LKPD is expected to facilitate students' learning, especially wave material with the discovery Learning model. This research can be used as an initial overview or reference for further development research.

Keywords: ADDIE; e-LKPD; Discovery Learning; wave material

INTRODUCTION

The rapid development of technology has significantly impacted the world of education, presenting serious challenges. It aligns with the development of the 5.0 era society. The Japanese government first introduced this era in 2019 to prevent the significant impact of the Fourth Industrial Revolution that could undermine deeply held human values. In the Society 5.0 era, education plays a crucial role in enhancing the quality of human resources. Addressing the challenges of the Fourth Industrial Revolution and Society 5.0 in education requires 21st-century life skills, known as the 4Cs: creativity, critical thinking, communication, and collaboration, to overcome global challenges (Rosefsky Saavedra & V. Darleen Opfer, 2012).

21st-century education integrates knowledge, skills, attitudes, and information and communication technology

management. These skills can be developed using various learning activity models. One model related to these skills is observational learning, in line with implementing the 2013 curriculum according to the Ministry of Education and Culture Regulation No. 22 of 2016.

According to (Luciana, 2021), Discovery Learning can expand students' knowledge and skills. In K13-based learning, students know they should seek knowledge instead of being given information (Haudi, 2021). The model enables students to use their mental processes to discover concepts and principles. Teachers are expected to develop teaching and learning activities that positively impact the education system. One supportive factor for teaching and learning activities is the availability of learning resources that allow students to understand the materials teachers convey (Nabilah et al.,

2023). One example of a learning resource that can be used is student worksheets (LKPD).

Typically, schools only use conventional-based standard worksheets for students. LKPD is usually taken directly from student textbooks, which may not necessarily align with the student's characteristics. Therefore, one way to support the teaching and learning process is by utilizing digital worksheets (e-LKPD) to make learning activities more engaging and encourage student participation throughout the learning process (Supriatna et al., 2022). Learning materials should be in an interactive digital format that is more efficient and effective regarding access, including audio, images, videos, and documents while enhancing students' interest, motivation, and skills (Nababan & Putri, 2022). Such devices are highly necessary as they have been proven to actively engage students in learning activities (Pratiwi & Yuliani, 2021).

Based on interviews conducted with teachers at SMA Sriguna Palembang, it was found that teachers lack an understanding of the current technology that can be applied in teaching and learning. Moreover, practical activities are often not carried out because teachers must meet the dense content targets according to the syllabus. Limited funds to acquire practical materials and equipment have resulted in schools having minimal and poor-quality laboratory equipment, which is ineffective for conducting practical activities. If practical activities are still forced to be conducted, the results cannot be used to build concepts, principles, laws, and theories that can be understood.

Based on observations, the student worksheets (LKPD) used in schools mainly consist of formulas without emphasizing physics concepts, and students' efforts to construct the materials are minimal.

According to the physics teacher at SMA Sriguna Palembang, students still struggle to understand the materials provided by the teacher during the learning process because they are not interested in abstract textbooks and find them boring. Therefore, LKPD, which guides students in discovering everyday concepts, principles, laws, and theories, is needed so that they can emphasize the meaning of learning and its relevance to physics and not directly provide formulas or definitions. With the innovation of technology in teaching and learning, printed LKPD has been transformed into e-LKPD. According to (Haqsari, 2014), e-LKPD is a student's work guide that facilitates filling it in an electronic format that can be viewed on desktop computers, laptops, smartphones, and cell phones. The purpose of e-LKPD is to facilitate the activities of both teachers and students. Teachers can provide a better understanding of the materials to the students, and e-LKPD can be used for active learning, fostering independence and responsibility (Nurhidayati, 2019).

Based on observations, the learning activities at SMA Sriguna Palembang show a lack of conceptual understanding and low student participation in physics classes. Several factors contribute to the low understanding of concepts and student engagement in learning, including: 1) Teacher-centered learning, where students are not accustomed to applying conceptual understanding to problem-solving. 2) The teachers do not well understand the learning models used. 3) Lack of creativity from teachers during classroom instruction. 4) Monotonous learning environment leading to student boredom and low activity in learning. The low conceptual understanding and lack of student engagement in learning contribute to poor learning outcomes. It is evident from the test results, with most

students score below the minimum passing grade. Among the topics covered, traveling waves has been particularly challenging. Based on the root causes of these issues, an alternative action can be proposed by implementing the discovery learning model. Masril et al., (2018) state that discovery learning is a model where educators provide students with the freedom to discover things on their own because when they discover things on their own, students better understand what they learn. It is in line with the opinion of (Linggile & Payu, 2022), who highlights the advantages of the discovery learning model in transforming passive learning conditions into active and creative ones.

Previous researchers have analyzed the e-LKPD needs. Relevant studies have concluded that students' creative abilities are still weak, indicating the need for educators and students to utilize e-LKPD. Asrori & Suparman (2019) and the research conducted by Puspita & Dewi (2021) demonstrate that e-LKPD captures students' attention and impacts their learning outcomes.

Based on direct observation and interviews, educators have not offered innovation to students, specifically e-LKPD based on discovery learning for traveling waves. As a result, students find it difficult to understand the subject matter and feel bored. Students also have a limited grasp of physics concepts, even though physics concepts are closely related to everyday applications. Therefore, educators must provide students with opportunities by planning motivating and student-centered learning experiences, highlighting the need for innovative e-LKPD for practical activities (Suryaningsih & Nurlita, 2021).

RESEARCH METHODS

This study falls under the research and development category, specifically focusing on the analysis phase of the ADDIE model. The needs analysis is crucial in this phase to identify the characteristics and profiles of the students. The ADDIE model is developed during the development phase, with the initial analysis focusing on student characteristics (Putri, 2022). This study aims to develop e-LKPD for students on traveling waves. The development of e-LKPD aims to facilitate students as an alternative additional learning resource in physics education. The study involved 36 students from the 12th-grade science class at SMA Sriguna Palembang. It employed a questionnaire as the research instrument, distributed to the students using the Google Forms platform. The data collection technique in this study involved filling out the questionnaire through Google Forms. The survey results presented in this article serve as an initial needs analysis for developing e-LKPD on traveling waves.

RESULTS AND DISCUSSION

The preliminary study results will include a literature review and field study findings. The literature review findings were obtained from books and scientific journals from various sources related to this research. The field study results were obtained through the distribution of questionnaires using the Google Forms platform, indicating that the students are not yet aware of e-LKPD as an alternative learning resource for physics on traveling wave. The findings of the needs analysis survey conducted for educators and students are as follows.

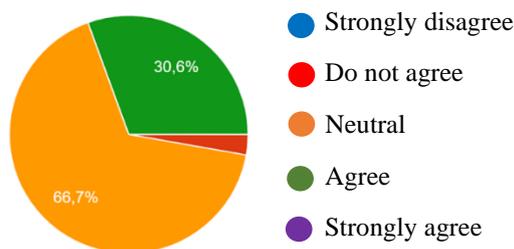
Table 1. Questions related to the needs of e-LKPD in Physics learning

No	Question
1	Do you enjoy learning Physics?
2	Do you actively ask questions to the teacher during Physics class?
3	Do you understand the Physics material after it is taught?
4	Have you ever used sources other than physics books and teacher explanations?
5	Does the teacher use instructional media during Physics class?
6	Have you ever conducted observations or experiments in the physics laboratory for the Physics subject?
7	Have you ever analyzed the results of observations or experiments?
8	Have you ever concluded from the results of observations or experiments?
9	Have you ever discovered something new from the results of observations or experiments conducted?
10	Have you ever presented the results of observations or experiments in front of the class?
11	Are you aware of other learning resources, such as e-LKPD?
12	Do you always access learning resources using communication devices?
13.	Do you find the topic of traveling wave difficult?

Physics Learning at School

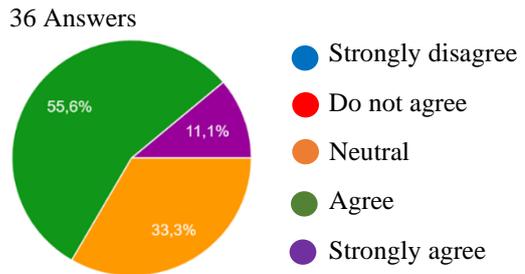
Based on the data in Figure 1, it is known that 30.6% of students enjoy studying Physics, while 66.7% of them are still unsure (neutral) about their liking for Physics, and 2.8% do not enjoy studying Physics.

Do you enjoy studying Physics?
36 Answers



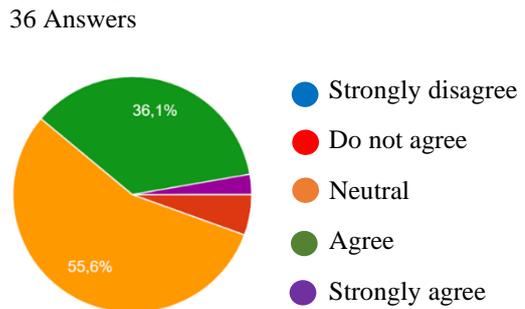
(a)

Do you ask friends when studying Physics actively?
36 Answers



(b)

Do you understand the Physics material after being taught?
36 Answers



(c)

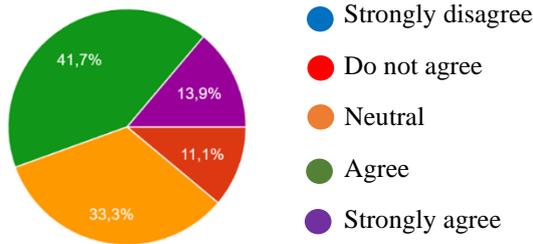
Figure 1. Analysis Related to Physics Learning in School

Further investigation into students' activeness in asking questions to their peers shows that 11.1% strongly agree, 55.6% agree, and 33.3% are still unsure (neutral). Next, looking at students' understanding of Physics, the results indicate that 36.1% agree, while 55.6% are still unsure (neutral).

Physics learning resources and media at school

Based on the data in Figure 2, it is known that 13.9% of students strongly agree that they have used other learning resources, while 41.7% agree, 33.3% are unsure (neutral), and 11.1% disagree. Furthermore, it is found that 11.1% strongly agree that teachers use instructional media during Physics lessons, 36.1% agree, and 47.2% are unsure (neutral).

Have you ever used other learning resources besides Physics books and teacher explanations?
36 Answers



Does the teacher use instructional media in teaching-learning Physics?
36 Answers

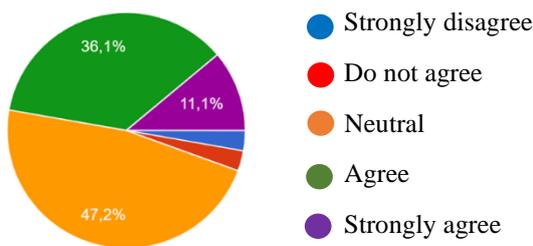
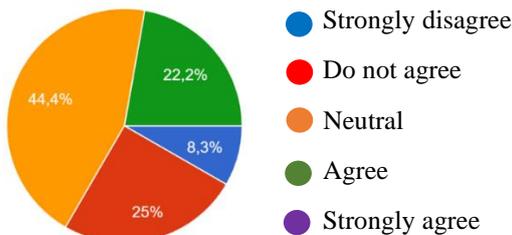


Figure 2. Analysis of Learning Resources and Media in Physics at School

Implementation of Discovery Learning in Physics Education at School

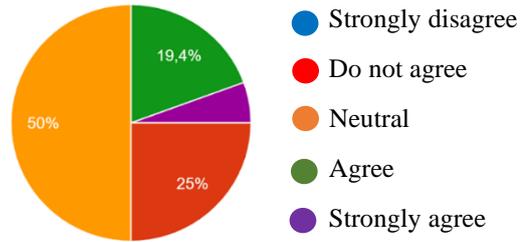
Based on the data in Figure 3, it is known that 25% of students disagree that teachers have conducted observations/experiments in the laboratory. 8.3% strongly disagree, 22.2% agree, and 44.4% are unsure (neutral).

Have you ever made laboratory observations or experiments on natural science material?
36 Answers



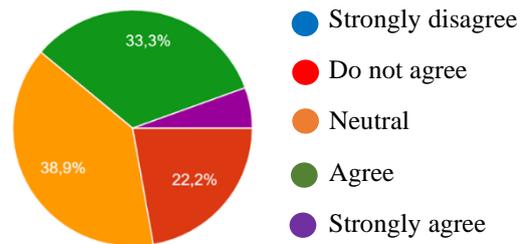
(a)

Have you ever analyzed the results of observations or experiments?
36 Answers



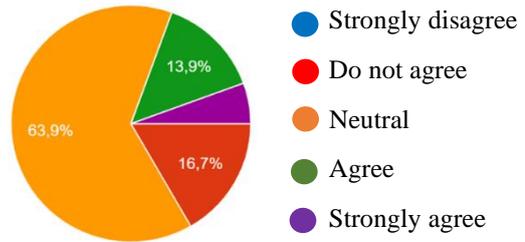
(b)

Have you ever concluded the results of observations or experiments?
36 Answers



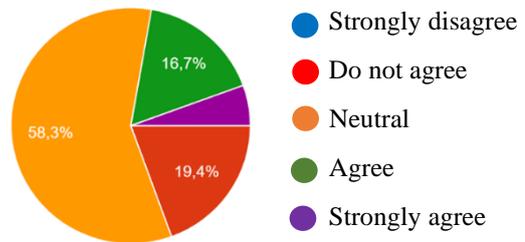
(c)

Have you ever been able to discover anything new from the results of observations or experiments that have been carried out?
36 Answers



(d)

Have you ever presented your observations or experiments in front of the class?
36 Answers



(e)

Figure 3. Analysis of the Implementation of Discovery Learning in Physics Education at School

Furthermore, it is found that 25% of students have never analyzed observation or experiment results. 19.4% agree, and 50%

are unsure (neutral). It is also known that 22.2% of students disagree that they have ever concluded from observation or experiment results. 33.3% agree, and 38.9% are unsure (neutral).

Additionally, it is known that 16.7% of students disagree that they have ever discovered something new from observation or experiment results, 13.9% agree, and 63.9% are unsure (neutral). Moreover, it is found that 19.4% of students disagree that they have ever presented observation or experiment results in front of the class, 16.7% agree, and 58.3% are unsure (neutral).

Based on the data, there is a need for learning resources and instructional media that can be used in physics education, particularly for experiments in the laboratory, using e-LKPD as a learning resource to facilitate students' learning process. It is especially important for physics topics related to laboratory experiments.

Implementation of e-LKPD in Learning

Do you know any other learning resources, such as e-LKPD?

36 Answers

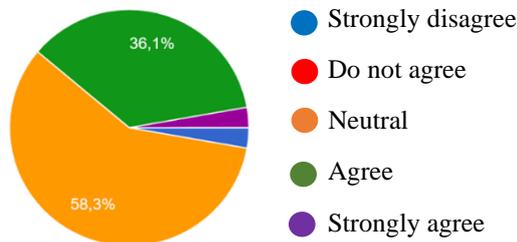


Figure 4. Analysis of the Use of e-LKPD in Learning

Based on the data in Figure 4, 36% of students agree that they are aware of other learning resources, such as e-LKPD. However, 58% of students are still unsure about the existence of other learning resources like e-LKPD. It indicates a lack of literacy among students regarding learning resources such as e-LKPD. Therefore, the

development of e-LKPD is needed to broaden students' understanding of the available learning resources.

The Use of Communication Devices in Learning

Based on the data in Figure 5 regarding the use of communication devices in learning, 19% agree with it. However, 72% are still unsure about using communication devices in learning. The use of communication devices in learning is highly recommended for students. It aligns with the advancements of the 21st century that require individuals to integrate technology into their daily lives.

Do you always access learning resources using communication devices?

36 Answers

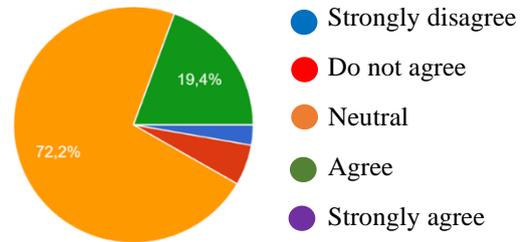


Figure 5. Analysis of the Use of Communication Devices in Learning

Difficult Learning Materials in School

Do you think traveling wave material is difficult?

36 Answers

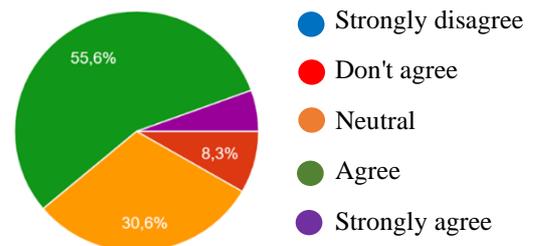


Figure 6. Analysis of Difficult Learning Materials in School

Based on the data in the figure, it is observed that 55.6% agree that the topic of traveling wave is considered difficult. Additionally, 30.6% are still uncertain, and 8.3% disagree. The difficulty in understanding the topic of traveling wave stems from its abstract nature. Therefore, a special teaching method is required to deliver this topic effectively.

CONCLUSION

Learning physics requires developing learning resources that can facilitate students' learning, especially in topics related to experiments or laboratory work. Thus, using e-LKPD (electronic learning materials) is necessary to facilitate the learning process for educators and students, as e-LKPD is more convenient and practical to use in line with the advancements of our time. It can be concluded that the development of e-LKPD worksheets based on the Discovery Learning model is particularly needed for the topic of traveling wave. This research can serve as an initial overview or reference for further development studies.

REFERENCES

- Asrori, A., & Suparman, S. (2019). Analisis Kebutuhan E-LKPD Sesuai dengan Problem Based Learning untuk Meningkatkan Kemampuan Berpikir Kreatif. *Prosiding Sendika*, 5(1), 18–22.
- Haqsari, R. (2014). *Pengembangan dan Analisis E-LKPD (Elektronik Lembar Kerja Peserta Didik) Berbasis Multimedia Pada Materi Mengoperasikan S*. Universitas Negeri Yogyakarta.
- Haudi, H. (2021). Strategi Pembelajaran. In H. Wijoyo (Ed.), *Insan Cendekia Mandiri*. <https://doi.org/10.33477/bs.v2i2.376>
- Luciana, N. (2021). Penerapan Model Discovery Learning dalam Meningkatkan Kualitas Pembelajaran dan Hasil Belajar Matematika Dua Sudut Pada Siswa Kelas XII IPA 1 SMA Negeri 1 Cisaat. *CENDEKIA: Jurnal Ilmu Pengetahuan*, 1(2), 106–111. <https://doi.org/10.51878/cendekia.v1i2.152>
- Masril, M., Hidayati, H., & Darvina, Y. (2018). Penerapan Ciscovey Learning Berbantuan Virtual Laboratory untuk Meningkatkan Kompetensi Fisika Siswa SMA. *Jurnal Penelitian Pendidikan IPA*, 5(1), 18–26. <https://doi.org/10.29303/jppipa.v5i1.160>
- Nababan, S. T., & Putri, D. H. (2022). Analisis Kebutuhan E-LKPD Terhadap Pembelajaran Fisika Di Masa Pandemi Covid-19. *JIPFRI (Jurnal Inovasi Pendidikan Fisika Dan Riset Ilmiah)*, 6(1), 32–40. <https://doi.org/10.30599/jipfri.v6i1.1199>
- Nabilah, R., Syuhendri, S., & Siahaan, S. M. (2023). Analisis Kebutuhan Pengembangan Ebook Bagi Guru Fisika Dalam Proses Pembelajaran. *VOX EDUKASI: Jurnal Ilmiah Ilmu Pendidikan*, 14(1), 164–174. <https://doi.org/10.31932/ve.v14i1.2199>
- Nurhidayati, S. (2019). Pengintegrasian Potensi Lokal Pada Mata Kuliah Pendidikan Karakter Untuk Meningkatkan Hasil Belajar Dan Rasa Hormat Mahasiswa Terhadap Lingkungan. *JUPE: Jurnal Pendidikan Mandala*, 4(4), 25–30. <https://doi.org/10.36312/jupe.v4i4.995>
- Pratiwi, D. E., & Yuliani, Y. (2021). Pengembangan e-LKPD Berorientasi Learning Cycle 7E pada Sub-Materi Perkecambahan Biji untuk Meningkatkan Keterampilan Proses Sains. *Berkala Ilmiah Pendidikan Biologi (BioEdu)*, 10(3), 541–553. <https://doi.org/10.26740/bioedu.v10n>

[3.p541-553](#)

- Puspita, V., & Dewi, I. P. (2021). Efektifitas E-LKPD berbasis Pendekatan Investigasi terhadap Kemampuan Berfikir Kritis Siswa Sekolah Dasar. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 5(1), 86–96. <https://doi.org/10.31004/cendekia.v5i1.456>
- Rosefsky Saavedra, A., & V. Darleen Opfer. (2012). Teaching and Learning 21st century skills: Lessons from the Learning Sciences. In *Rand Corporation*. <https://eur-lex.europa.eu/legal-content/PT/TXT/PDF/?uri=CELEX:32016R0679&from=PT%0Ahttp://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52012PC0011:pt:NOT>
- Supriatna, A. R., Siregar, R., & Nurrahma, H. D. (2022). Pengembangan E-LKPD Berbasis Problem Based Learning pada Muatan Pelajaran Matematika pada Website Liveworksheets di Sekolah Dasar. *Edukatif: Jurnal Ilmu Pendidikan*, 4(3), 4025–4035. <https://doi.org/10.31004/edukatif.v4i3.2844>
- Suryaningsih, S., & Nurlita, R. (2021). Pentingnya Lembar Kerja Peserta Didik Elektronik (E-LKPD) Inovatif dalam Proses Pembelajaran Abad 21. *Jurnal Pendidikan Indonesia (Japendi)*, 2(7), 1256–1268. <https://doi.org/10.36418/japendi.v2i7.233>