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### PBL-Based e-LKPD (*Problem Based Learning*) to Facilitate Student Concept Understanding on Human Sense System Materials

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#### Abstract

The use of technology today is very useful for online learning, namely as a provider of various learning resources. LKPD (Student Worksheet) is one of the learning resources that can be used by students in learning. E-LKPD based on PBL (*Problem Based Learning*) can be applied in biology learning on the material of the human sense system in which there are practicum activities. The purpose of this study was to produce a PBL-based e-LKPD, to test the feasibility and practicality as well as the effectiveness of the media in facilitating the ability to understand concepts and independent learning of students. The development model in this study uses the ADDIE development model (*Analysis, Design, Development, Implementation, Evaluation*). The feasibility test is carried out by experts and the e-LKPD readability test. The potential of e-LKPD in facilitating students' conceptual understanding skills is obtained from the results of student work and posttest results. The results showed that the feasibility level of e-LKPD according to media and material experts was 71.15% (adequate) and 85.57% (very feasible). The readability of e-LKPD according to students is 80.12% (adequate). The results of student work in working on e-LKPD showed a good category with a percentage of 80.31% (XI MIPA 4) and 82.83% (XI MIPA 6). And the average posttest results for both classes get a percentage of 94.11% and 91.17%. The conclusion of this study is that the PBL-Based e-LKPD that has been developed is feasible and effective to use in learning.

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## PRELIMINARY

The COVID-19 pandemic that occurred in Indonesia prompted the government to issue new policies, especially in the world of education. The government released a policy in which learning is entirely done online. Learning from home activities were implemented after there was a Circular letter from the Ministry of Education and Culture of the Republic of Indonesia number 3 of 2020 in the education unit regarding the Prevention of the Spread of Coronavirus Disease / COVID-19 (Astin i, 2020). This policy resulted in a reduction in the intensity of face-to-face meetings between teachers and students, the next impact was that teachers were unable to produce printed learning resources. According to Selwyn ( 2011), teachers can provide appropriate learning resources by utilizing digital technology as a means of support. Digital technology in learning can be used as a support for learning activities as well as a means of accessing material source information. Therefore, teacher are required to be able to utilize technology to provide effective learning resources during online learning.

Based on the results of an interview with one of the biology teachers at SMA Negeri 1 Purwareja Klampok, during online learning, the teacher is limited to sending material in pdf form through classroom and giving assignments to students. Such a learning model makes students less enthusiastic in participating in lessons so that the level of participation in learning activities also decreases. If you look at this phenomenon, one of the factors is the lack of attractiveness of the learning media that is the source of the material. It can be concluded that media is needed as an interesting learning resource in order to restore students' enthusiasm in participating in the online learning process.

To make it easier for students to learn online, PBL -based LKPD learning resources will be developed (*Problem Based Learning*) electronic form. The e-LKPD media will be packaged in an attractive manner with the composition of the material, illustrations in the form of pictures and videos to support the material. With the video on the e-LKPD, it can be used to visualize the material being studied. During the pandemic, students must have an independent attitude and awareness of the importance of learning even though it is done at home house. Independent learning of students can be seen from the sense of responsibility, discipline and attitude of initiative to learn. Making this LKPD can train students to have a sense of responsibility in learning. That is, with the material, the steps of the activities that must be carried out and the questions that must be done (Prastowo, 2014). And a problem-oriented learning approach with the aim of getting a solution can develop student learning independence (Wahana & Physics, 2013).

Through the experimental activities contained in the e-LKPD, students will be trained to solve problems independently. E-LKPD created with the help of *Flip PDF software Corporate Edition*. With this software, you can load videos on in it to attract students' interest in learning. *Flip PDF Corporate Edition* Software chosen to help design LKPD with additional video illustrations as a real picture of the material being studied (Yunianto *et al.*, 2019). So that the concepts of abstract biological material will become concrete and complex material will become easier to understand ( Fathiyati & Utami 2012 ).

Based on the description above, this opportunity is considered very important to conduct research related to the development of a technology-based learning device. Because at this time technology-based learning devices are needed as a means of learning media that can be done. In addition, utilizing the media can be used as one of the innovations that can be used to help deliver material during online learning.

## RESEARCH METHODS

The development of E-LKPD uses the ADDIE ( *Analysis, Design, Development, Implementation, Evaluation* ) method (Branch, 2009). The initial stage of development is to analyze the need for teaching materials. The second stage is design, designing e-LKPD and developing the instruments needed for research. The third stage is development, assessing the feasibility of e-LKPD experts. The fourth stage is implementation, feasibility test conducted by teachers and students after using e-LKPD in the learning process and the effectiveness of e-LKPD in facilitating conceptual understanding and student learning independence.

Data collection was carried out through the interview, validation and questionnaire stages. The data analysis technique was carried out by analyzing the feasibility of the material and the feasibility of the e-LKPD media carried out by experts and the e-LKPD readability test by students. The potential of e-LKPD in facilitating students' conceptual understanding abilities is obtained from the results of student work and learning outcomes. Data collection techniques and instruments are presented in table 1.

**Table 1. Data Collection Techniques and Research Instruments**

No	Research data	Data collection technique	Research Instruments	Data source
1	Needs Analysis	Teacher interview and questionnaire	Teacher Questionnaire	Teacher
2	Eligibility and legibility level of e-LKPD	Questionnaire	Media expert Eligibility Sheet Material Expert Eligibility Sheet E-LKPD legibility questionnaire e-LKPD response sheet	Media Expert Material Expert Student
3	Level of Effectiveness on Concept Understanding Ability	Analyzing answers in e-LKPD Test instrument	assessment sheet on e-LKPD Posttest	Teacher and student Results of student work on e-LKPD Posttest score

The data obtained were analyzed descriptively quantitatively. Furthermore, data from interviews with biology teachers were analyzed descriptively. Then the data obtained from the results of the feasibility questionnaire according to the experts and the questionnaire of the results of the readability test in the form of a score will be converted into a percentage form with the following formula.

$$N = \frac{\sum \text{Skor yang diperoleh}}{\sum \text{Skor maksimal}} \times 100\%$$

Description: N = Score in percent,  $\sum$  = Amount,

The results of the feasibility assessment, legibility and practicality of the e-LKPD that have been obtained are matched with the eligibility criteria, legibility can be seen in Table 2.

Table 2. Evaluation criteria for e-LKPD

interval	Criteria
$25\% \leq \text{skor} < 43,75\%$	Not feasible
$43,75\% \leq \text{skor} < 62,59\%$	Decent enough
$62,59\% \leq \text{skor} < 81,25\%$	Worthy
$81,25\% \leq \text{skor} < 100\%$	Very worth it

E-LKPD can be said to be feasible if it gets an assessment percentage of more than or equal to 62.59%. While the data from the mastery of students' conceptual understanding will be converted into a percentage form with the following formula.

$$N = \frac{\sum Si}{s} \times 100\%$$

Description: N = Score in percent,  $\sum Si$  = Total score obtained, S = Maximum score

The criteria for scoring the percentage level of students' conceptual understanding abilities can be seen in Table 3 .

Table 3. Criteria for Students' Concept Understanding Level

No	Understanding Level (%)	Criteria
1	86 – 100	Very good
2	76 – 85	Well
3	66 – 75	Enough
4	55 – 65	Not enough
5	$\leq 54$	Very less

(Source: Ngalim Purwanto, 2008 )

## RESULTS AND DISCUSSION

In this section, the results of research and development are presented which include 2 things, namely (1) the feasibility of the e-LKPD, (2) and (2) the effectiveness of the e-LKPD.

### Feasibility of PBL-Based e-LKPD on Human Sense System Material

The feasibility of e-LKPD is determined from the validation results of media experts and material experts. The results showed that the media validation of all indicators got a decent category with a score percentage of 71.15 % . Aspects on the media that are assessed include technical aspects and construction aspects. These aspects are closely related to writing on e-LKPD. The media has been said to be suitable for use in the learning process because the e-LKPD has met the indicators from all aspects.

The results of the media assessment in terms of writing e-LKPD stated that the composition of the presentation was in accordance with the writing indicators on the teaching materials . The letters and sentences used in the e-LKPD are easy to read by students . The appearance of an attractive layout and design on the e-LKPD can motivate students' interest in reading and the presence of pictures and videos on the e-LKPD makes the impression more attractive. So, the feasibility of presenting on the e-LKPD media is considered feasible, because it is considered to be in accordance with the components of the e-LKPD . With such e-LKPD, students will be more motivated to read it and interested in learning it. According to Fadli *et al.* , (2017) a teaching material can be declared feasible in terms of writing , namely if the letters are not too small and easy to read, and the text is decomposed regularly, then the layout and size of the images are balanced. The ease of use of teaching materials is found in the writing of the content, the letters used

and the attractive appearance. According to Rofi'ati *et.al.*, (2014) , teaching materials equipped with pictures and videos can help students in the process of understanding the material , make it easier to remember, and motivate student learning.

The validation results from the material experts informed that all aspects of the material in the e-LKPD were categorized as very feasible with a score percentage of 85.57 % . The aspects assessed include didactic and language aspects, which are related to the suitability of indicators and the use of language in the preparation of sentences. The material contained in the e-LKPD is arranged according to the order of the learning achievement indicators. The use of simple language in the arrangement of sentences in the e-LKPD makes it easier for students to better understand and understand the content of the material presented. However, there are still some parts of the material explanation that are felt to be incomplete and specific, so it is necessary to add material according to the direction of the material expert. Nurseto (2011) states that learning media must be able to facilitate and assist students in achieving learning objectives. Endang (2018), explained that the aspects assessed in terms of linguistics include the accuracy and effectiveness of sentence structure, sentence coherence, and the accuracy of language use to clarify students' understanding.

The components that make up the e-LKPD consist of an introductory section, a material content section, and a closing section. The introductory section includes a table of contents, introduction, concept map, instructions for use, learning objectives, and indicators. The content section consists of material descriptions of the five human sensory systems , while in the closing section there are student worksheets and evaluations in the form of descriptions. The components contained in the e-LKPD will provide information to students about the material to be studied. Instructions for use listed on the e-LKPD can help students learn independently. According to Shobirin (2013), teaching materials are generally divided into 3 core parts, namely the introduction, the content of the material and the closing section. And the making of LKPD must adapt to the characteristics that are able to support students according to the purpose of making teaching materials (Khairunnisa *et al* , 2019).

The overall value of the validation results from media experts and material experts stated that the developed e-LKPD was feasible to be used in the learning process. Furthermore , to determine the level of readability according to students, a small-scale trial was carried out. The readability test was carried out by 30 students by filling out a questionnaire. The results obtained from the readability test of e-LKPD get a score percentage of 80.12 % with a decent category. According to students, a good E-LKPD is interesting to read, letters and writing are easy to read . The presence of images on the e-LKPD makes it attractive for students to learn, as well as the use of e-LKPD which is easily accessed directly by students in the learning process. However, there are still some comments and suggestions given to improve e-LKPD . Among them regarding the typeface and font size that is too small so it is difficult to read. Teaching materials can be said to be suitable for use in the learning process if the level of readability of the product can facilitate student learning interest in the material being studied (Dewi & Arini, 2018).

Furthermore, responses related to e-LKPD by students were given after learning, namely to classes XI MIPA 4 and XI MIPA 6. The assessments obtained from students received positive responses, with the average percentage of each class being 70.62% of the class. XI MIPA 4 and 75.14% class XI MIPA 6. This

means that the PBL-based e-LKPD is considered feasible by students to be used in the learning process.

The teacher's assessment of the e-LKPD gets a very decent category. All of the indicators applied to the e-LKPD have met what will be achieved in learning. The attractive appearance of the e-LKPD is one of the keys so that students are interested in continuing to learn. E-LKPD is made with easy-to-read type and size of writing. Likewise with the main components of the material, the suitability of images and videos that support the completeness of the e-LKPD. The material on the e-LKPD is presented in a form that is more practical to use, that is, it can be directly accessed via the link provided. According to Widjajanti (2008), that e-LKPD will look interesting and amazing if you pay attention to the technical requirements, namely an attractive appearance, paying attention to the images used, the use of color and the presence of an explanatory video that supports the subject matter. According to Pratama *et al.*, (2020), the teaching materials needed today must consider the ease of access and use in distance learning (online).

Students' assessment of the e-LKPD gets a decent category, which is the same as the assessment of teachers, namely getting a positive response from students. The assessment of e-LKPD in terms of appearance according to students is attractive as a learning resource. Attractive cover, placement of titles, text, and images in accordance with the composition. The selection of fonts, sizes and spaces used is appropriate to make it easier for students to learn. The use of communicative language, using a clear sentence structure so that it is easy for students to understand. The use of e-LKPD is easily accessible directly. The suitability of material indicators with basic competencies and core competencies is in accordance with the applicable curriculum. The preparation of the material on the e-LKPD provided is in accordance with the order of the sub-chapters of the human sense system material. Khafida (2021) says that the systematic presentation of e-LKPD must be presented in a consistent manner, with coherent concepts and paragraphs. Likewise with the usefulness of e-LKPD in student learning independence. Students can easily learn e-LKPD independently with clear instructions for use on e-LKPD. According to Fitriani *et al.*, (2016) that teaching materials can help students understand learning concepts and can help students' memory of lessons. Electronic Student Worksheets (e-LKPD) can facilitate the ability to understand students' material concepts.

Based on the analysis of the validation results above, overall it can be concluded that the PBL-based e-LKPD is declared valid for use in the learning process. This is evidenced by the overall assessment of the validator getting a decent category. In addition, it is also supported by a readability assessment given by students. With a total of 30 students obtained an average percentage of 80.12% with a decent category. E-LKPD is improved according to suggestions and comments obtained from media experts, material experts and students, before further testing its effectiveness.

### **Effectiveness of e-LKPD in Facilitating Student Concept Understanding**

The PBL-based e-LKPD effectiveness test was conducted to find out how teaching materials can facilitate conceptual understanding and student learning independence. The effectiveness test was carried out on a large scale using 2 class XI MIPA SMA Negeri 1 Purwareja Klampok. This PBL-based E-LKPD can facilitate the ability to understand concepts through questions and activities in the e-LKPD which are in accordance with the indicators of the ability to understand concepts. In addition, the existence of e-LKPD can also facilitate students to study independently. This will be explained further in the description

below.

### **Potential of e-LKPD in Facilitating Concept Understanding**

The potential of PBL-based e-LKPD in facilitating concept understanding can be seen from the scores obtained by students in working on e-LKPD and *posttest results*. Based on Table 4.11 the results of the average percentage of students in class XI MIPA 4 and XI MIPA 6 respectively are 80, 26 % and 82, 76 % with good criteria. And for the results of the ability to understand concepts based on the results of the *posttest*, the average percentage is 94.11% and 91.17%, respectively. This means that the PBL-based e-LKPD that was developed can facilitate the ability to understand students' concepts on the sensory system material in humans. Students are said to be able to understand the concept of material if they get a final score according to the minimum KKM limit from the school of 70 and have a percentage for the level of understanding of the concept of 76 % (Purwanto, 2002).

This study shows that the percentage of KKM completeness in schools for students is quite high. The completeness of the student's KKM is due to the occurrence of information processing at the time of learning. In learning the material of the human sense system, there is a process of receiving information and then the information is processed so that output is produced in the form of learning outcomes. Information processing there is a correlation between the internal conditions and external conditions of individuals. Internal conditions are situations within a person that are needed to achieve learning outcomes while external conditions are stimuli from the environment that affect a person's learning process (Rehalat, 2016). From this statement, it can be seen that student learning outcomes in the human sense system material are related to students' internal conditions in the form of cognitive processes to achieve learning outcomes and external conditions in the form of external stimuli. Mastery of KKM is also related to the achievement of basic competencies in the material of the human sense system.

Student success is related to the ability to understand material concepts, namely being able to independently carry out activities 1 to 5 contained in the e-LKPD properly and correctly. Activities and questions on e-LKPD are made based on indicators of concept understanding ability including (1) being able to restate, (2) clarifying based on concepts, (3) presenting concepts in other forms, and (4) applying concepts to problems (Anderson & Krathwohl .2015). In addition, e-LKPD is also prepared based on the PBL (*Problem Based Learning*) learning model. The application of the PBL learning model can make it easier for students to understand the core of the material concept with problems that must be proven. The PBL learning model is also able to improve students' understanding with the stages that can provide a learning experience, so that learning indicators can be achieved (Desriyanti & Lazulva, 2016).

From the results of the work on the e-LKPD, students were able to do all the activities correctly. Students are said to be able to understand the concept of material if the results of the work of e-LKPD get a final score according to the minimum KKM limit from the school of 75 and have a percentage for the level of concept understanding 76% (Purwanto, 2002). However, there are some of the students' answers that are still not in accordance with the indicators, this is because these students did not carry out the experiments contained in the e-LKPD. In addition, it is caused by the ability of each student is different and the lack of readiness in oneself to accept the material being studied. Another factor for students in

understanding the concept of learning material is the intrinsic factor found in the students themselves, including motivation, readiness and attention (Slameto.2013).

Thus, the developed e-LKPD can facilitate students in understanding the concept of the material. The analysis of the answers in the final e-LKPD report has almost fulfilled all the indicators of understanding the concept. Understanding of what is learned with what is done is very important so that there are no misconceptions between theory and practice, so students are able to explain each answer on the e-LKPD in their own sentences without changing the meaning. According to Purwanto (2008), the level of ability to understand concepts can be seen from the students answering questions using their own words according to their knowledge without changing the meaning. The achievement of the objectives of high school biology learning is to be able to understand the concepts of biological material and to be able to develop basic biology skills to foster a scientific attitude (Puskur. 2006). Mastery of concept skills in students for learning biology is very important so that students can remember the concepts they learn longer.

Based on the analysis of student work and posttest scores, it is concluded that e-LKPD has the potential to facilitate understanding the concept of human sensory system material. This is evidenced by the results obtained from class XI MIPA 4 and XI MIPA 6 respectively have an average percentage of 80.26% and 82.76% and the final grade of learning outcomes gets a percentage of 94.11% and 91.17 % with very effective category.

## CONCLUSION

The PBL-Based Electronic Student Worksheet (E-LKPD) that was developed has met the product eligibility and received a very feasible category. And PBL-based E-LKPD obtain effective criteria in facilitating understanding of material concepts by obtaining effective criteria

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