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Development of Digital LKPD Based on Problem-Based Learning on the Topic of the Human Digestive System

Senja Amalia Rahmawati[1], Hani Irawati[2]
[1,2] Pendidikan Biologi, Universitas Ahmad Dahlan, Indonesia
Email: hani@pbio.uad.ac.id

ABSTRACT

The biology learning process in some schools so far still uses teaching materials in the form of printed student worksheets (LKPD). The printed LKPD used still has several shortcomings, including not yet attractive, the images are still black and white and inflexible, so it is necessary to develop LKPD that suits the needs of students in biology learning materials. The purpose of this research is to develop digital LKPD based on Problem Based Learning digestive system material in humans. The type of research carried out is R&D with the ADDIE model which consists of 5 stages, namely: Analysis, Design, Development, Implementation, and Evaluation. Data collection techniques with questionnaires while the data collection instruments used are in the form of questionnaires of assessment sheets of material experts, media experts, education experts, biology teachers and student responses. Product trials are carried out to learners divided into small group tests and large group tests. The results of this study show that: Problem-Based Learning digital LKPD based on digestive system material in humans which is assessed by material experts, media experts, education experts, and biology teachers in the "very good" category, students respond with the "very good" category, so that the digital LKPD developed is suitable for use in the biology learning process.

KEYWORDS *Digital LKPD, Problem Based Learning, digestive system*

INTRODUCTION

Learning is the process of interaction between students and educators and learning resources in a learning environment. The concept of learning according to Huda (2013) is a process in which a person's environment is intentionally managed

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to enable participation in certain behaviors under special conditions or produce responses to certain situations. Learning is a special part of education. Learning activities will be successful if supported by a complete learning tool (Irawati & Aprilia, 2024).

Learning tools are devices that must be prepared by teachers before carrying out the learning process (Rahayu et al, 2022). In the 2013 curriculum, learning tools consist of an academic calendar, learning media, assessment instruments, lesson plans and teaching materials. Teaching material is a material consisting of (information, tools, and text) that is arranged systematically which shows the objectives of the competencies to be mastered by students (Kusumaningrum et al., 2017). One of the teaching materials that can be developed and widely used in the biology learning process is the Learner Worksheet (LKPD). LKPD is defined as a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students with reference to the Basic Competencies (KD) that must be achieved (Prastowo, 2014). LKPD can be used to guide students in thinking and mastering learning materials both learning in the classroom and learning outside the classroom (Aprilia & Irawati, 2022).

During this time in the biology learning process, teaching materials that are widely used are LKPDs purchased from publishers, not the result of development by teachers. In the LKPD that is used more contains a summary of the material and practice questions only. Learning activities that students must do in the learning process are not clearly illustrated. The LKPD used is a printed LPKD that contains images and text that is still black and white, this makes students not interested in using these teaching materials. Learning will go well if teachers and students use teaching materials that can facilitate learning activities well (Irawati & Saifuddin, 2018).

Learning in the context of 21st century learning, especially in the 2013 curriculum, requires teachers to be able to present material through examples, applications, and real-world experiences both inside and outside of school (Rahayu et al., 2022). In order for these demands to be implemented as part of the 2013 curriculum implementation, it is necessary to involve the use of ICT in an appropriate, sustainable, and affordable manner (Irawati & Hidayati, 2024). The development of digital LKPD can be a solution to package biology learning activities that are attractive to students according to the needs analysis conducted that it turns out that students prefer teaching materials in digital form.

The delivery of biology learning materials, apart from being packaged using teaching materials that suit the needs of students, also requires an attractive learning model for students (Elci et al., 2021). The learning model is a framework that provides a systematic description for carrying out learning in order to help students learn in certain goals to be achieved (Faturohman, 2015). This means that the learning model is a general description but still focuses on specific goals (National, 2010). The selection of a learning model must be adjusted to the characteristics of students, the characteristics of learning materials and also the supporting infrastructure for learning at school (Zuchri & Irawati, 2021). One of the learning

models that can be used in implementing the 2013 curriculum is the *Problem Based Learning* (PBL) learning model (Ahyar et al., 2021).

The *Problem Based Learning* (PBL) learning model is a learning model using syntax, namely orienting students to the problem, organizing students, guiding investigations, developing presentation of results and analyzing or evaluating problems. The application of the PBL model in biology learning is expected that students are accustomed to solving problems. (Suliyati *et al.,* 2018). The *Problem Based Learning* (PBL) learning model will assist students in developing problem-solving skills, increasing understanding and knowledge, and activeness in gaining knowledge (Handayani & Koeswanti, 2021).

The biology learning materials mandated in the 2013 curriculum for grade XI high school students are all related to cells and systems that occur in the human body. One of the materials that are considered difficult by grade XI students is food digestion system material (Tasril & Putri, 2019). This material will discuss starting from the structure of the functions of the food digestive organs, the process of food digestion, abnormalities in the food digestive organs and also test the content of food substances.

To support the implementation of a learning process that is in accordance with the characteristics of students, teaching materials are needed that suit the needs of students. The teaching material developed is LKPD in digital form that packs material about the digestive system in humans and can be used anytime, anywhere based on the *Problem Based Learning* (PBL) learning model. This LKPD uses the PBL model to be more contextual and can support the thinking process of students to be able to provide solutions to real problems that occur in everyday life.

RESEARCH METHOD

This research is development research using ADDIE model. Development research is a systematic and logical learning design process, which aims to determine the program that will be carried out in teaching and learning activities and adjust to the competencies and potential possessed by students. The ADDIE development model consists of 5 main stages, namely: *Analysis*, Design, Development, Implementation, *and Evaluation*. The data collection method used in this research is a questionnaire. Questionnaire is a technique or method of collecting data by providing a list of questions or questions that are written to be answered by respondents. While the data collection instrument used in this research is Questionnaire. Questionnaire is a technique or way of collecting data indirectly (researchers do not directly ask questions with respondents). This questionnaire was distributed to the test subjects, namely material experts, media, education, biology teachers, and students. The research data were analyzed descriptively quantitatively and qualitatively. The data obtained from the experts' assessment will be converted using the following conversion:

Quality Score	Eligibility Criteria
0% - 25%	Not good

26% - 50%	Less Good
51% - 75%	Good
76% - 100%	Very good

Table 1. Guidelines for product assessment by experts and biology teachers

Table 2. Guidelines for students' response to the product

Quality Score	**Criteria**
0% - 50%	Good
51% - 100%	Very good

The teaching materials developed are said to be suitable for use in the learning process if the assessment of the experts is in the very good category.

RESULT AND DISCUSSION

Results

Table 3. Assessment results of material experts, media experts, education experts, and biology teachers on the developed digital LKPDs

No.	Assessment	Percentage (%)	Criteria
1.	Material Expert	91,19%	Very good
2.	Media Expert	84,47%	Very good
3.	Education Expert	75,00%	Very good
4.	Biology Teacher	91,78%	Very good

Table 4. Results of small group and large group trial learner responses

No.	Assessment	Percentage (%)	Criteria
1.	Small Class Test	98,33%	Very good
2.	Beaar Class Test	99,17%	Very good

Discussion

LKPD is one of the teaching materials that can help the biology learning process. LKPD developed by teachers must be in accordance with the curriculum used by schools and must be flexible to be used in learning activities both online and offline (Irawati & Aprilia, 2024). LKPD developed by a researcher or teacher

must always keep up with the times and be easily accessible to students anytime and anywhere (Rahmawati et al., 2022). Digital LKPD can be developed with various applications, one of which is by using *google sites.* This application is one of the services that functions to create a website. As part of *Google Workspace* (formerly G Suite). Google Sites offers many productivity features and integration with other Google applications (Irawati & Hidayati, 2024). Selection of *Google Sites* to develop LKPD because this application is easy to use and students are very *familiar.*

The developed digital LKPD includes: home page, learning instructions, introduction, learner activities, evaluation, reference and author's bio. On the home page, the title of the LKPD and the menus in the LKPD are displayed. Learning instructions contain instructions that must be carried out by students during the learning process using LKPD. In the introduction section contains introductory material to remind students of the same material that has been studied in junior high school. In the learner activity section, three learning activities are displayed that must be passed by students consisting of learning activity 1, namely material about organs in the food digestive system, learning activity 2 which contains material on the process of food digestion and abnormalities of food digestion organs, and learning activity 3 which contains practical material for testing the content of food substances. Evaluation contains questions that must be done by students to measure understanding of the material that has been learned. References contain all the literature used in the preparation of LKPD materials and the author's bio gives a brief introduction of the author.

The developed digital LKPD was assessed by material experts, media experts, education experts and also biology teachers. Based on the assessment of the material experts, the developed digital LKPD has very good criteria. The developed LKPD has used Indonesian language that is clear and easy to understand, the contents of the digital LKPD have an attractive appearance, there are pictures and videos that make it easier for students to understand the material studied. The evaluation questions contained in the digital LKPD are in the form of questions that are used to measure the level of understanding of students towards learning. This is supported by the opinion of Nisfiyah & Susanti (2019) that good teaching materials for students must be able to understand and clarify the material and according to the level of knowledge of students. The developed digital LKPD also has the advantage of being able to be used anywhere and anytime by using *cellphones, computers*, laptops, tablets and other electronic devices that allow the network to access digital LKPD online.

Media experts gave a very good assessment of the developed LPKD. According to media experts, the selection of digital LKPD for learning biology in SMA class XII is in accordance with the advances in technology that are developing today. Digital LKPD is developed by combining images, sounds, and also videos to make students more interested in learning biology. The writing and display in the LKPD are also easy to read and the tools in the LKPD can be functioned properly. One of the criteria for a good digital LKPD is easy to operate (Safitry et al., 2023).

Education experts gave a very good assessment of the developed digital LKPD. According to education experts, the selection of the PBL model in the

development of LKPD is in accordance with the demands of the 2013 curriculum where the recommended learning models are PBL and PjBL (Maghrifah, 2020). The use of this *website-based* digital LKPD has advantages including an attractive design, equipped with materials, images, and videos. This increases students' curiosity about learning biology material on the digestive system in humans. The use of digital LKPD makes it easy for students to operate. Digital LKPD is made simply and can make students more active in learning the material of the digestive system in humans. This digital LKPD can only be accessed using electronic devices such as *cellphones*, *computers*, laptops, tablets and other electronic devices that allow the network to access digital LKPD *online.*

Biology teachers assessed that the digital LKPD developed in terms of material and media was very suitable for the needs of students. The selection of any teaching material that will be used in the learning process must be in accordance with the needs of students (Irawati & Saifuddin, 2018). LKPD that has been used in the learning process at school usually only consists of questions and introductory material, but does not contain other activities that are more challenging, while in the LKPD developed is equipped with various learning activities and one of the interesting ones is the practice of testing the content of food substances. This is in line with the opinion of Rosmalinda & Pamela (2023) which states that students in high school enjoy learning much more with direct practice not only theory. Biology teachers also assessed that the evaluation presented in the developed LKPD can be used by students to measure their ability to understand the material studied. The purpose of learning evaluation is to measure the ability of students after completing the learning stages (Purnama et al., 2020).

Positive responses were given by learners both in the small class test and the large class test. Learners responded that the digital LKPD used in the learning process helped them to learn more quickly and purposefully. In addition, students also said that the digital LKPD developed was easy to carry and did not require a large internet quota in its operation. The video presented in the LKPD helps students to more easily understand the learning material about the food digestion system in humans. The practice of testing the content of food substances adds to the enthusiasm of students in biology learning activities.

CONCLUSION

Based on the results of the research that has been done, the results obtained that the digital LKPD developed received an assessment from material experts, media experts, education experts, and biology teachers in the "very feasible" category. The developed digital LKPD can be used in the biology learning process in class X high school. Students' responses to digital LKPD based on *Problem Based Learning on* the material of the digestive system in humans for class XI MIPA students in small group tests and large group tests were declared "very feasible".

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