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Development of Problem-Based e-LKPDs Assisted by CANVA to Stimulate Numeracy Skill and Visual Literacy

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Abstract: This research aims to determine the validity of e-LKPD. As well as stimulating students' visual literacy and numeracy skills through the development of problem-based e-LKPD. The population in this study were students of class XII MIA at SMAN 1 Abung Selatan, North Lampung Regency for the 2023/2024 academic year. This research is a Design and Development Research (DDR) empirical research with 4 procedures or stages, namely, analysis, design, development. With a pretest posttest control group design. Data collection was carried out using test and observation methods. Problem-based learning is applied in the experimental class while Direct Instructor (DI) is the Control class. The results of the research showed that the experimental class students' numeracy and visual literacy skills increased by 0.71, while the control class increased by 0.56. Based on the results of this research, it shows that the problem-based e-LKPD experienced an increase in both the experimental class's numeracy and visual numeracy skills. compared to the control class. The results of the t-test show that it has a positive influence on students' visual literacy and numeracy skills with output results (49) = 0.235. So it can be concluded that the application of problem-based e-LKPD can improve students' visual literacy and numeracy skills

Keywords: PBL; Numeracy skills; Visual literacy.

Introduction

Technology plays a full role in the development of life, talking about technology that is inseparable from the internet and gadgets where everything has taken advantage of internet facilities. Based on the results of a survey by the Association of Indonesian Internet Service Providers (2022), it shows that 77.02% of Indonesia's population has used the internet. The data increased 10.12% from the previous year. When accessing information, a person cannot be separated from the term visual literacy, which is the process of processing information through seeing, thinking, reading, writing and calculating to get precise and accurate information. The Skills Matter report released by the Organization for Economic Cooperation and Development/ (OCED 2016), shows that based on the Program for the International Assessment of Adult Competencies (PIAAC) test it is known that, the literacy level of Indonesian adults is in the lowest position of the 40 countries participating in the this program. It is also known that the application of literacy in Indonesia is still not in line with the concept of the industrial revolution 4.0, where all activities such as learning can utilize the internet network to help students build their abilities (Tohir, 2019).

Based on these data, it is necessary to hold efforts to increase the visual literacy of Indonesian citizens, especially the use of the internet as a means to access information. Yusuf et al (2019), stated that the very rapid development of the digital era needs to be balanced with the preparation of creative, innovative and competitive Human Resources (HR) by optimizing the use of advances in the digital world as a tool in the field of education. One of the efforts to increase visual literacy is carried out in the field of education, by making visual

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literacy an important competency that students must master in order to develop skills in using technology properly (Conference 2016; Stokes 2002).

21st century learning brings students to the digital era and influences the learning structure of the world of education, especially in mastering technology Erdem (2020). The challenges of the 21st century are supported by the strategic role of the world of education, it is hoped that students will master higher order thinking skills (HOTS) and skills in utilizing Information and Communication Technology (ICT) to face global challenges (Kemendikbud, 2017) . HOTS that students must have consists of Critical thinking and problem solving, Creativity and innovation, Communication, numeracy and Collaboration. (Farisi 2016; Trilling and Fadel 2009).

Students are required to be able to master various competencies in learning Physics (OECD, 2010). One of these competencies is numeracy skills. Numeracy is used in the language of Physics as a tool to logically express, handle and develop concepts and theories of physics and is used to determine most of the content and meaning of the concepts and theories of physics itself (Sagala *et al*, 2019). Numeracy is also the ability to think in using concepts, procedures, facts, and accommodating arithmetic tools to solve real problems using internet assisted media, OECD smartphones, (2010).

The use of smartphones in learning can make it easier for students to access various sources and materials provided by teachers, such as assignments contained in Syafitri's e-LKPD (2020). e-LKPD is a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for carrying out learning tasks that must be done by students referring to the basic competencies that students must train. Learning using e-LKPD as electronic media can be categorized as e-learning which can facilitate formal and informal teaching and learning activities (Stephens & Victoria, 2009).

The use of e-learning in learning physics by using the media makes learning as a learner. Students will have many opportunities to think, especially in understanding knowledge and solving problems. Students are also free to interact with each other, so that students can enrich their knowledge and avoid social barriers that can hinder their thinking processes. One of the uses of e-learning in learning, namely through Canva, with the expected output is that teachers can easily create and facilitate their creativity in adding text, images, videos, documents, or other types of content to make e-LKPD interactive and attractive to students. students and able to help students in facing learning difficulties (Yunara, *et al*. 2018)

Method

This research uses the Design & Development Research (DDR) approach in the product development research category. The DDR approach is a systematic approach and involves a process of design and development as well as evaluation which is based on empirical research (Richey, R,C & Klein, J, D, 2007).

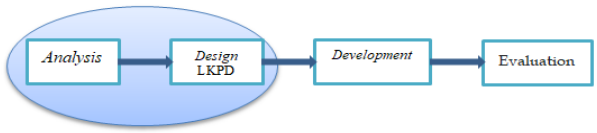

Figure 1: Stages of Method.

Each stage carried out as follows:

Analysis

Analysis stage, analyzing needs and identifying the availability of products to be developed. Needs analysis was carried out by interviewing several students and subject teachers at school. A needs analysis is carried out to determine the potential and problems at the school. Information obtained based on needs analysis becomes the basis for conducting research (Khamadi, 2020). At this stage, analyzing the Identification of Problems and Needs for e-LPKD Teaching Materials, as many as 87.5% of teachers have not prepared teaching materials that can motivate and make it easier for students to study abstract physics material, especially when the use of e-LKPD is still minimal.

Design

After obtaining analysis data on teacher and student needs, the researcher created an initial draft of the e-LKPD. The preparation of the e-LKPD design is carried out by dividing the structure of the material that will be presented in the e-LKPD and adjusting it to the achievement indicators that will be achieved at each meeting. e-LKPD is prepared for learning in two meetings. The learning implementation plan is prepared by referring to the revised 2013 curriculum. After completing the division of the material structure, the researcher created a story board, created an e-LKPD on the Canva platform, and created a validation instrument for the content and product construct. Several other explanations made by researchers at this stage are explained as follows:

1. Prepare references, images and materials.

Researchers collected articles that were relevant to the material used in the e-LKPD

2. Product design plan

This e-LKPD design was created using Canva web. The following e-LKPD display can be seen in Figures 2 and 3.

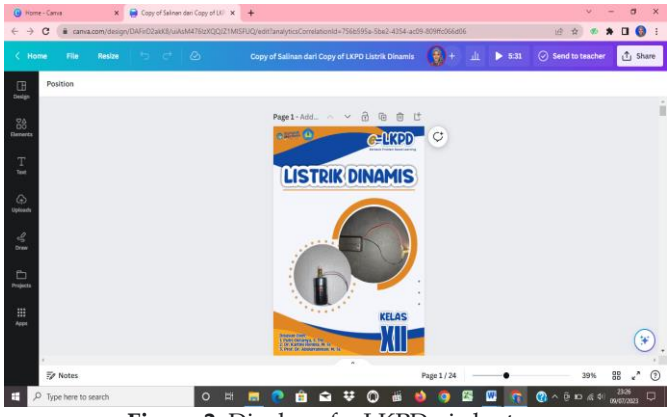

Figure 2. Display of e-LKPD via laptop

Figure 3. Display of e-LKPD via Smartphone

Develop

The e-LKPD format consists of three parts, namely the opening, main and closing parts. The opening section consists of a cover, foreword, table of contents, instructions for using e-LKPD, final objective, KI, KD, and indicators. The core part consists of learning activities 1, 2, and 3. Each learning activity consists of providing phenomena and PBL (Problem Based Learning) activities on worksheets that stimulate students' visual literacy and numeracy skills. The closing section consists of an evaluation and a bibliography.

Learning activities are designed for online and offline learning by stimulating students' visual literacy and numeracy skills. The realm of student analysis begins by presenting a phenomenon at the beginning of each learning activity in e-LKPD to guide students to find problems and solve them on the worksheets provided. In the evaluation section, students are expected to be able to solve the questions after completing the learning activities on the e-LKPD. The final part of the e-LKPD, namely the bibliography, contains several references used to compile the material and content in the e-LKPD.

Figure 4. View of the LKPD Cover

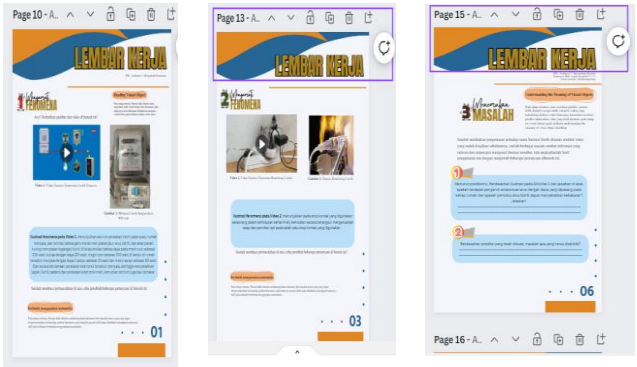

Figure 5,6,7. Front View of Each Learning Activity

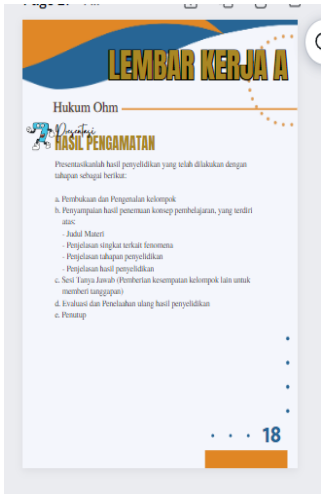

Figure 8. Evaluation View

Result and Discussion

Validation Results

At the validation stage, expert assessments are carried out to determine the suitability of teaching materials in terms of content and construct (Phungsuk,

et al. 2017). Validation tests were carried out before the initial e-LKPD product was implemented to students. Validation was carried out by one expert lecturer and two expert practitioners.

Table 1. expert validation results

Test Type	Rated aspect	Total average percentage	Validation criteria
(1)	(2)	(3)	(4)
Content validation	Breadth and depth of material	90%	Very high
	Accuracy of evaluation questions	81%	Very high
	Reflection suitability	83%	Very high
	Task suitability	88%	Very high
Validasi Konstruk	Suitability of cover design on the front view of e-LKPD	88%	Very high
	Suitability of layout, text, images, videos and links to the main material	85%	Very high
	Ease of navigation in browsing e-LKPD	79%	Tall
	Conformity of PBL and completeness of e-LKPD	79%	Tall

Practical Results

The practicality test was carried out through testing the readability of *e*-LKPD, the feasibility of learning activities using *e*-LKPD (Muhammad, 2018), and student responses. Readability is determined through an assessment questionnaire given to students which consists of 12 statements. The implementation of learning is known through observations made by observers. Observers are asked to fill in the observation sheet for implementation of learning. Student responses are known by filling out a questionnaire consisting of 20 statements. Each practicality test, namely: *Readability Test Results*, Implementation Test Results value of students' visual literacy and numeracy skills was obtained through observation during the learning process. The observed results of observing visual literacy and numeracy skills are the results of psychomotor learning. Assessment of students' visual literacy and numeracy skills includes aspects of: observation, measuring, formulating hypotheses, planning experiments, conducting experiments, processing data and assessments. The research was conducted when the learning took place using observation sheets. At the first meeting the control class and the experimental class used the direct instruction (DI) learning model to obtain visual literacy and numeracy skill pretest data. At the second meeting the control class used the DI learning model, while the experimental class received treatment using the project based learning (PBL) learning model to obtain posttest data on visual literacy and numeracy skills.

The results of the calculation of the N-Gain test for visual literacy and numeracy skills in the control class were 0.55, including the moderate category, while the experimental class was 0.64, including the moderate category. The results of the analysis showed that the increase in visual literacy and numeracy skills of the experimental students was greater than that of the control class. The values of visual literacy and numeracy skills and the N-Gain test for the control class and the experimental class are presented in table.

Table 2. Difference between control class and experimental class

Categori	Control class	Experimental Class
lowest value	44.55	43.44
The highest score	94.83	75.34
N-Gain criteria	0, 55 currently	0.64 currently

Based on the results of the analysis, it was found that the experimental activities carried out showed visual literacy and numeracy skills. Observed. The N-Gain value of visual literacy and numeracy skills in the control class was 0.55 while in the experimental class it was 0.64. The results of the experimental visual literacy and numeracy skills assessment showed that most of the students were quite good at understanding visual literacy and numeracy skills. While the control class showed that most of the students had not been able to understand visual literacy and numeracy skills. Table on shows that PBL learning can improve students' visual literacy and numeracy skills in dynamic electricity material compared to the DI learning model. The results of increasing each aspect of visual literacy and numeracy skills based on experimental values and control classes.

Once it is known that the data is normally distributed, then a paired sample t-test is performed on two data, namely the pretest and posttest which come from paired samples. This test was conducted to determine the effectiveness of using the CANVA-assisted e-LKPD integrated PBL as seen from the value of student learning outcomes before and after being given the learning treatment using the e-LKPD.

The development of *e*-LKPD was carried out using PBL assisted by Canva to increase visual literacy (Lestari *et al*. 2022). e-LKPD developed in such a way has characteristics, competencies, mathematical literacy or numeracy. The characteristics include aspects of numeracy skills, which include several competencies:

Mathematical thinking and thinking; mathematical argumentation; mathematical communication; mathematical communication; problem solving, communication, mathematics, tools and technology. (Rizki and Priatna 2019) . The development of problem-based e-LKPD products is an assessment of the importance of technological skills for the future generation who are interested in the relationship between numeracy skills and visual literacy. As access to technology becomes more abundant, education must recognize the need for the potential for this technological advancement. (Letwinsky 2017).

Then the effect size test results use the Cohen's equation of 0.43 in the medium category. This shows the effectiveness of numeracy skills and visual literacy in learning when using the developed e-LKPD.

Table 3. T-test Result

Nilai	t	df	Asymp. Sig (2-tailed)
Pretest-Posttest	-37.179	50	.000

Conclusion

Based on the description of the results and discussion above, it can be concluded that: Validity, indicated by the average percentage of content validation of 89% and construct validation of 88%. Practicality, shown by the average readability score of 80%, the implementation of the e-LKPD in each learning activity is 79.07%, and the positive response of students to the e-LKPD is 77.75%. Effectiveness, indicated by the n-gain value of 0.55 in the medium category and the results of the effect size test of 0.64 in the medium category.

Author Contributions

All authors had significant contributions in completing this manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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