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The Influence of the PBL Model Assisted by Lectora Inspire 18 Dynamic Fluid Material on Mastery of the Concept of SMAN 3 Jember

Lia Silvira[1], I Ketut Mahardika[1,2,3,4], Maryani[1]

[1] *Physical Education Study Program, University Of Jember, Jl. Kalimantan Tegalboto No.37, Krajan Timur, Sumbersari, Kec. Sumbersari, Jember, 68121, Indonesia,*
[2]*Science Education Study Program, University Of Jember, Jl. Kalimantan Tegalboto No.37, Krajan Timur, Sumbersari, Kec. Sumbersari, Jember, 68121, Indonesia,*

[3]*Master Education Study Program, University Of Jember, Jl. Kalimantan Tegalboto No.37, Krajan Timur, Sumbersari, Kec. Sumbersari, Jember, 68121, Indonesia,*

[4]*Study Program of Doctoral Science Education, University Of Jember, Jl. Kalimantan Tegalboto No.37, Krajan Timur, Sumbersari, Kec. Sumbersari, Jember, 68121, Indonesia,*

Corresponding author. Email:liasilvira89@gmail.com

ABSTRACT

In the era of the 21st century, the transformation of learning that focuses on the role of teachers into a focus on active student engagement is essential. Lack of mastery of concepts by students is often influenced by the selection of learning models and media that are less supportive, resulting in less responsiveness of students to the learning process. The purpose of this study was to examine the effect of the PBL model assisted by Lectora Inspire 18 dynamic fluid material on mastery of physics concepts. This research is an experimental research with pretest-posttest control group design. Data collection methods consist of writtent tests. Data analysis techniques for mastering concepts use the Mann Withney U Test, while critical thinking skills use score criteria. The results showed Asymp.Sig. (2-tailed) of 0.000 (<0.05). The conclusion obtained is that there is a significant influence on the application of the PBL model assisted by Lectora Inspire 18 dynamic fluid material on mastery of physics concepts

Keywords :.Mastery of concept, the PBL model, Lectora Inspire 18.

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I. INTRODUCTION

Education is the most important thing for students as a provision in facing an era that continues to develop [1]. This seems parallel to the development of the 21st century regarding the necessity for students to have problem-solving, communication, collaboration and critical thinking skills [2]. Physics is a field of science that studies natural indications and their interactions related to the real world on critical thinking patterns[3]. [4] stated that the low understanding of physics concepts is due to the inability for students to think critically. This makes students tend to memorize physics equations and work on problems without understanding concepts. Low mastery of physics concepts is also caused by lack of practice and habituation in learning that is only oriented to problem practice, without giving adequate emphasis to developing a thorough understanding of concepts [5]. As a result, students find it difficult to solve problems and there is a perception that physics is difficult and very boring.

The results of limited interview observations applied by researchers at SMAN 3 Jember obtained information that students are less trained in mastering concepts so that the ability to solve problems during learning is less developed and tends to be passive. Lack of student involvement during the learning process makes it difficult for students to understand physics concepts optimally. [6] affirms that increasing the ability to understand concepts has a positive impact on the development of students' creativity in thinking. On the other hand, learning tools that are consistently used in schools tend to be similar from year to year. This causes the learning methods applied tend to be limited to lecture and question and answer methods during the physics

learning process in class. As a result, the responses given by learners do not meet the indicators of critical thinking skills that should be measured according to learning indicators.

The use of the PBL learning model becomes a learning model that involves students and helps in achieving effective learning [7]. The PBL model is a learning model that relies on problem solving in learning and students solve these problems with all their knowledge and skills from various sources obtained [8]. Although each individual has different abilities, the implementation of the PBL model of students in the learning process can be done in groups to solve the problems given [9]. Thus, to obtain information related to problem solving, students are trained to learn independently, while the teacher's role is more as a facilitator in the smooth learning process.

The PBL model is closely related to interactive learning media that aims to train students to think critically, overcome complex problems, conduct analysis, work cooperatively in small groups, and improve the achievement of their learning outcomes [10]. In the PBL model, real-world problems are presented as learning contexts that encourage the development of critical thinking, basic problem-solving skills, and acceptance of knowledge that trigger active involvement of learners in the learning process [11]. When learners study environmental problems around them, learners can improve critical thinking skills to find appropriate solutions to those problems [12]. By receiving knowledge through real-world contexts through PBL models, it can strengthen mastery of concepts through active involvement of learners in the learning process [13].

One of the interactive learning tools that aims to improve problem-solving skills is the *Lectora Inspire 18. Lectora Inspire 18 is an* application in creating *e-learning* content developed and used to combine *flash*, video, combine images and screenshots [14]. *Lectora inspire 18* can be applied as a medium to create learning content designed to challenge students in solving problems, facilitate discussion and collaboration, and show the application of learning concepts being learned [15]. On the other hand, *Lectora Inspire 18* which can increase the attractiveness of learning and facilitate communication and cooperation between learners that deepens understanding through discussion and exchange of ideas [16]. Thus, the use of *Lectora Inspire 18* in PBL is one of the alternatives to increase learning effectiveness and facilitate the achievement of more optimal learning objectives.

The concept of dynamic fluids is an important part of the physics learning curriculum [17]. However, in reality most learners still have a limited understanding of dynamic fluids, limited to understanding equations without understanding the basic concepts [18]. Students are taught the basic concepts of fluid mechanics simply by listening and observing the laws applied by the teacher, without being directly involved in discovering these laws [19]. As a result, students have not been able to apply equations to solve dynamic fluid problems in everyday life.

In connection with the exposure to the above problems, it is concluded that appropriate models and media are needed to improve mastery of concepts and critical thinking skills in learning physics subjects. Thus, a research entitled "***The Effect of the PBL Model Assisted by Lectora Inspire 18 Dynamic Fluid Material on Mastery of Concepts and Critical Thinking Skills of SMAN 3 Jember***".

II. METHOD

This research was carried out at SMAN 3 JEMBER class XI in the first semester of the 2023/2024 academic year with the determination of the research site based on the placement of teaching assistance which allows researchers to have easy and more intensive access to the observed population. Research sampling with homogeneity test of daily test scores of learning material that has been taught. From the homogeneity test results show homogeneous data so that the sample is determined through the *cluster random sampling* method to determine the experimental class and control class [20]. Based on this, control class XI-01 and experimental class XI-02 were obtained. The control class uses a conventional learning model in the school, namely direct *instruction* and an experimental class using the PBL model assisted by *Lectora Inspire 18* dynamic fluid material.

Assessment of mastery of concepts is carried out in both classes obtained from the posttest carried out at the end of each lesson. The type of research conducted by researchers is *true experiment* with a quantitative descriptive approach [21]. This approach focuses on the relationship between research variables that focus on current problems and phenomena that are happening at the present time with the form of research results in the form of numbers that have meaning [6]. Then, in this study applied *Pretest-posttest control group design.* The research design can be seen based on the following table:

Pattern Table 2.1 *Pretest-posttest control group design*

E	**O1**	**X**	**O2**
K	**O3**		**O4**

(Arikunto,. S. 2020 :125).

Data collection techniques are carried out with pretest and *posttest* test activities that refer to Bloom's

Taxonomy of cognitive domains C4 (analyzing), C5 (evaluating), and C6 (creating) [5]. The data analysis technique used with the Mann Withney U test is because the data obtained are abnormally distributed [22] .

III. RESULTS AND DISCUSSION

Data collection techniques are carried out with pretest and *posttest* test activities that refer to Bloom's Taxonomy of cognitive domains C4 (analyzing), C5 (evaluating), and C6 (creating). The data analysis technique used with the Mann Withney U test is because the data obtained are abnormally distributed.

Table 3.1 Average Results of Pretest and Posttest Data Mastery of Concepts

	N	Minimum	Maximum	Mean	Std. Deviation
Pretest Experimental Class	33	,00	75,00	49,5455	22,53863
Posttest Experimental Class	33	57,14	100,00	77,8806	14,88359
Control Class Pretest	34	,00	50,00	17,6471	20,43969
Posttest Control Class	34	25,00	87,50	59,9265	22,98291
Valid N (listwise)	33				

Based on table 4.1, it can be seen that the average posttest score of experimental class students is 77.8806 with a minimum value of 0 and a maximum value of 75. While the average posttest score of the control class concept mastery results was 59.9265 with a minimum value of 25 and a maximum value of 87.50.

The normality test aims to determine the distribution of normal data or not. To go to the Independent Sample T-Test test stage, normally distributed data is needed. *Kormogolrov-Smirnov type testing* with a significant level of 0.05.

Table 3.2 Results of the Normality Test Mastery of Physics Concepts Experimental Class and Control Class

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Class	Statistic	Df	Sig.	Statistic	df	Sig.
Results of Mastering Student Concepts	Pretest Experimental Class	,153	33	,048	,892	33	,003
	Posttest Experimental Class	,256	33	,000	,840	33	,000
	Control Class Pretest	,365	34	,000	,698	34	,000
	Posttest Control Class	,285	34	,000	,806	34	,000

Based on the results of the *Shapiro-Wilk* normality test, it can be known that the significance value of the experimental class posttest is 0.000 and the control class posttest is 0.000. The resulting significance value is smaller than the significance level, which is 0.05 so that the conclusion of the data on mastery of the concept of students is not normally distributed.

The students' concept mastery test data is not normally distributed because the significance value is not more than 0.05 so it is not eligible for hypothesis testing using the *Independent-Sample T-test.* Another alternative is to apply the *Mann Withney U Test* to determine the average difference between the experimental class and the control class.

Table 3.3 Test *Mann Withney Output and Test*

Test Statistics[a]

The results of mastering the concepts of students Mann-Whitney U	279,500
Wilcoxon W	874,500
Z	-3,644
Asymp. Sig. (2-tailed)	,000

Based on table 4. The *output of the Mann Withney U Test* test obtained an Asymp Sig. (2-tailed) value of 0.000. So H0 is rejected and Ha is accepted, which means that there is a difference in mastery of concepts between the experimental class treated with the PBL model assisted by *Lectora Inspire 18* dynamic fluid material and the control class with the conventional model. Thus, the average score of the results of mastering the concepts of experimental class learners was significantly better than the control class.

The success of the learning process by applying the Lectora Inspire 18-assisted *PBL model* of dynamic fluid material depends not only on the role of the teacher, but is also strongly influenced by active participation and student involvement. The PBL model emphasizes problem-based learning that allows learners to be active in solving problems, collaborating, and exploring solutions. In this context, the active role of learners, their ability to interact with dynamic content, and the possibility for self-exploration through the tools provided by *Lectora Inspire 18* are important factors contributing to learning success. With their involvement in solving problems and using dynamic fluid materials, learners can deepen their understanding of concepts, improve problem-solving skills, and be better prepared for real-world challenges. Compared to the control class, which only applies conventional learning accompanied by practicum with lecture methods, question and answer, practicum and assignments with a scientific approach 5M in accordance with 21st century learning skills following the 6C.

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This is in accordance with the results of research from [14] the application of the PBL model with interactive media has a significant effect on students' mastery of concepts. And also according to the results of research from[1] the learning *media Lectora Inspire 18* deserves to be a practical and effective learning media. The PBL model emphasizes learning through real problem solving and context-based projects [23]. [24] states the PBL model requires learners to be engaged in solving real challenges from the real world, both individually and in groups. This develops curiosity as well as encourages learners to actively participate in learning, especially dynamic fluid material. Therefore, it will deepen the conceptual understanding of students in dynamic fluid materials. On the other hand, the use of learning media is closely related to the level of thinking in PBL model indicators, because it can make something abstract more concrete or simplify something complex [25]. One such medium is the *Lectora Inspire 18* which can increase the attractiveness of learning and facilitate communication and cooperation between learners deepening understanding through discussion and exchange of ideas.

IV. CONCLUSION

Based on the research that has been done with the results described above, it can be concluded that there is an influence of the PBL model assisted by *Lectora Inspire 18* dynamic fluid material on mastery of the concept. With their involvement in solving problems and using dynamic fluid materials, learners can deepen their understanding of concepts, improve problem-solving skills, and be better prepared for real-world challenges

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