The development of moodle based e-learning for newtons’ law in high school physics

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\textbf{Abstrak.} This study aims to develop Moodle-Based E-Learning for Newton’s Laws in high school. The research method used is research and development (R&D) with the ADDIE approach. The e-learning was then assessed by media experts, material experts, and physics teachers. The instrument used is a Likert scale questionnaire. The developed model has a lot of interactions with the user as a student activity. The expert and user assessment show this Moodle-based e-learning for Newton’s Laws in high school is suitable for use in physics learning.

I. Introduction

Students can explore their own ability to learn by increasing their innovation through e-learning [1]. Concerning student enhancement, the previous study shows that e-learning system development using specific learning approaches or models can improve student’s skills and understanding. Problem-based e-learning for heat and thermodynamic topics can be used to train critical, creative, collaborative thinking [2]. Besides, e-learning using the 5E learning cycle strategy can increase student’s understanding of the electricity topic [3]. Indeed, through the e-learning platform, teachers can design discovery learning-based independent learning [4].

Student characteristics in learning are generally divided into two parts, students who are motivated and who are involved in the classroom. Bringing up the student’s motivation can be from the rewards displayed in the system [5]. It confirms that various representations are needed in the learning platform [6]. After students got the motivation, positive emotions will arise. Positive emotions can also influence the interest in learning. Therefore, activities in e-learning can be constructive in the learning process. These positive emotions increase student’s motivation in knowledge [7]. The application of game methods or some activity similar to a game for the use of e-learning is an effective way to attract student motivation. As a result, it helps attract student motivation in learning to use e-learning. Students are more interested in using e-learning accompanied by activities such as a game for the learning method. It is also influenced by positive emotions that arise when students use it [8].

The selection of software to design the platform can use several types. For example, the content management system can use WordPress [3], or the learning management system can use Moodle [9]. Moodle is an e-learning platform that can support learning in several ways, such as enabling educators to increase their creativity in developing material for students while also improving their learning methods [9]. The Moodle platform is an e-learning platform that focuses on helping educators. In this case, Moodle provides the best tools or plugins so that educators can take advantage of their creativity. Moodle can help educators create effective e-learning even in online use. Moodle is also a platform rich in activities [10]. This study develops Moodle-based e-learning for Newton’s law in high school physics to see the feasibility of various activities in e-learning in physics learning.
2. Method
This study used the research and development methods with the ADDIE approach, consisting of five stages; analyzing, designing, developing, implementing, and evaluating. This product will be developed in the physics education digital media laboratory at the state university of Jakarta. This product will be validated by two experts, are media and material experts. The validator will be given a Likert scale questionnaire. This product was assessed by a physics teacher at a senior high school in Jakarta.

3. Result and Discussion

3.1. Analyzing
The first step in this research is to analyzing students’ needs and gathering information about e-learning. The survey results obtained indicate that students need e-learning which contains many activities to increase their interest to learn. Then, after further analysis, students need e-learning that can help them learn.

3.2. Designing
The design of e-learning can be seen in Figures 1, 2, and 3. Figure 1 shown front page display, while Figure 2 shown the dashboard display and course page display shown in Figure 3.

![Figure 1. Design of front page display](image1)

![Figure 2. Design of dashboard.](image2)
3.3. Developing

The next stage in this research is to develop the design stage. The following is the development result of the development design can be seen in Figures 4, 5, 6, and 7. Figure 4 shown the frontpage of e-learning, and Figure 5 shown the dashboard while course display shown at Figure 6 and Figure 7.
3.4. Implementing

After developing the product, e-learning will be tested for validation by media experts and material experts. Table 1 is the result of the validation of the product.

Table 1. E-learning validation test by media expert.

| No | Aspect             | Presentation Scale | Interpretation   |
|----|--------------------|--------------------|-----------------|
| 1  | Front page display | 70%                | Feasible        |
| 2  | Dashboard display  | 100%               | Very feasible   |
| 3  | Use of illustration| 100%               | Very feasible   |
| 4  | Content Eligibility| 100%               | Very feasible   |
| 5  | Activities on E-learning | 100% | Very feasible |
|    | Average of all aspects | 92.5%             | Very feasible   |

Table 1 shows that the validation result by media expert reach the average score, which is very feasibility interpretation or in presentation scale is 92.5%. This value is obtained because the dashboard display, illustration, content eligibility, and activities on e-learning reach a very feasible interpretation. However, the front page display only gets feasible performance.
Table 2. E-learning validation test by material expert.

| No | Aspect                  | Presentation Scale | Interpretation |
|----|-------------------------|--------------------|----------------|
| 1  | Presentation of material | 95.45%             | Feasible       |
| 2  | Use of language         | 100%               | Very feasible  |
|    | Average of all aspects  | 96.67%             | Very feasible  |

Table 2 shows that the validation result by material expert reaches the average score, which is very feasible or in presentation scale is 96.67%. This value is obtained because the presentation of material got the feasible interpretation, and the use of language on e-learning got very feasibility interpretation. After the validation test, the product assessed by physics teacher, the result shown in Table 3.

Table 3. Tested result by physics teacher.

| No | Aspect                  | Presentation Scale | Interpretation |
|----|-------------------------|--------------------|----------------|
| 1  | Presentation of material | 86.11%             | Very feasible  |
| 2  | Use of language         | 100%               | Very feasible  |
| 3  | Design of E-learning    | 100%               | Very feasible  |
| 4  | Illustration on course  | 100%               | Very feasible  |
| 5  | Activities on E-learning| 100%               | Very feasible  |
|    | Average of all aspects  | 93.75%             | Very feasible  |

Table 3 shows that the result by physics teacher reach the average score, which is very feasible with the presentation scale is 93.75%. This value is obtained because the presentation of material, practice, design, use of language, and activities on e-learning got very feasibility interpretation.

3.5. Evaluating

Based on the results of validation tests and trials by physics teachers, it can be stated that e-learning products are of very feasible value for use in learning physics. Based on previous research, e-learning can increase the creativity of educators [11]. The result shows that educators’ creativity can increase students’ positive emotions so that student’s interest in learning can increase too.

4. Conclusion

The product is e-learning that focuses on student activities. Several activities make learning easier for students, such as examples of questions using the fill in the blank technique, practice questions using multiple-choice, learning using course presentations, and several other supporting activities. E-learning is designed so that students take part in learning. First, they are given exercises for practice or sample questions. If students can answer questions, then students are allowed to continue learning. However, if the student answers the question incorrectly, the student is asked to repeat the lesson. According to the validation carried out by media experts and material experts, this product was declared very feasible. The score by media experts was 92.5%, and the score by material experts was 96.67%. Tested by physics teacher was declared very feasible with a score of 93.75%. Therefore, this e-learning for Newton’s law in high school physics is very suitable for use in school physics learning.

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6. References

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