

Development of Teaching Materials Based on Web in Physics Learning Evaluation Course

Dewi Ratna Pertiwi Sitepu^{1,*} Derlina² Rahmatsyah³

¹ Physics Education Department, Postgraduate, Universitas Negeri Medan

² Physics Education Department, Postgraduate, Universitas Negeri Medan

³ Physics Education Department, Postgraduate, Universitas Negeri Medan

*Corresponding author. Email: dewiratnasitepu@gmail.com

ABSTRACT

The problem faced so that research was made is that Blended Learning-based learning media has never been used in the learning process. The research objective is to describe the level of practicality, effectiveness, and impact of Blended Learning-based learning media on improving student learning outcomes. The research carried out is a type of research and development or Research and Development (R&D) with the ADDIE development model. The research sample is one class of Executive Physics Education Master Program B 2018 which was selected using simple random sampling. The research results obtained are blended learning-based learning media developed with the ADDIE design including the very practical, effective category and the average learning outcomes in the complete category and the level of interaction of blended learning-based learning media developed with the ADDIE design on student learning outcomes belonging to the high category.

Keywords: *Blended Learning, practicality, effectiveness and learning outcomes.*

1. INTRODUCTION

Teaching materials are a set of materials that are systematically arranged both written and unwritten, so as to create an environment or atmosphere that allows students to learn [1]. In line with Rosidah's opinion teaching materials are all materials (both information, tools, and texts) that are arranged systematically, with the aim of planning and reviewing the implementation of learning and learning activities, for example; textbooks, modules, handouts, Student Worksheets, models or mockups, audio teaching materials, interactive teaching materials, electronic teaching materials and so on [2]. Teaching materials can be in the form of print, audio, video, television, multimedia, and web teaching materials. According to Tasri web-based teaching materials are teaching materials that are prepared, run, and utilized with the web [3].

Many researchers have conducted research on the development of web-based teaching materials. Some of them Annake states that web-based teaching materials are appropriate to be used as an alternative in the learning process with a percentage of 86% falling into the valid category [4]. In line with the results of Dyah's research which shows that the website-based

teaching materials that have been developed are 87.25% in the very good category and meet the feasibility of being used in independent learning without being limited by space and time as an effort to improve student understanding [5].

Web-based teaching materials are often also called internet-based teaching materials, online teaching materials or e-learning. One application of information technology that has the potential to be used as the development of web-based teaching materials that can be used as an alternative to learning is known as e-learning. According to Daryanto e-learning is a learning system that utilizes electronic media such as computers as a tool to assist learning activities [6]. E-learning has the effect of transforming education from conventional into digital form, both in terms of content and system. Through e-learning, teachers can process learning materials, namely: compiling syllabus, uploading materials, giving assignments to students, accepting student assignments, making tests or quizzes, giving grades, monitoring activity, managing grades, interacting with students and fellow teachers. through discussion forums, and chat. Surjono argues that students can also access information and learning materials, interact with fellow students and teachers,

send and receive assignments, take tests or quizzes, and see the achievement of learning outcomes [7].

Based on initial observations made on April 8, 2019 at the Master of Physics Education Study Program, State University of Medan, the information obtained that the learning process has not used technology-based learning media, lecturers only use conventional learning such as delivering material using presentation slides (Powerpoint) which only contains static text and images, lectures, and discussions using facilities provided by the campus such as LCD projectors. The internet network facilities provided are good but not used properly in the learning process. Conventional learning which is still widely used today has several advantages and disadvantages. The advantages obtained are conveying information quickly, generating interest in information, teaching students the best way to learn by listening, easy to use in the learning process. While the weakness of this learning is that not all students have the best way of learning by listening, it is often difficult to keep students interested in what they are learning, students do not know what their learning goals are that day, students attend lectures only to meet attendance requirements. and there is a tendency to be less prepared when it comes to presentations in class, the absorption is low and quickly disappears because it is memorizing. In addition to teaching methods, the time needed to teach each subject matter on campus is very less and the process of delivering teaching materials is almost completely carried out in the classroom which causes the delivery of teaching materials to be late or even not delivered if the meeting does not occur.

One of the solutions to the problems found in the Master of Physics Education Study Program at the State University of Medan is to develop web-based teaching materials by utilizing the latest information and communication technology to improve the quality of education. Technology in education is called E-learning. The benefit of using e-learning is to facilitate the learning process in learning. e-learning becomes an alternative solution and technology to be used in the learning process in accordance with the demands of the industrial revolution 4.0.

The process of implementing e-learning requires a technology-based learning system that allows lecturers to manage content while carrying out learning management functions more easily and flexibly. A learning management system (LMS) or Virtual Learning Environment (VLE) in the form of a web application to create effective online learning has been widely introduced. The Learning Management System is a very popular system, through the Learning Management System, lecturers can manage lecture materials starting from drafting lecture contracts, uploading materials, giving assignments, accepting and responding to student work, making quizzes or tests, conducting assessments,

monitoring student participation, and interacting. with students both in scientific forums and online discussions.

By using E-Learning, lecturers have the ability to increase the intensity of interactive communication with students outside of the official class schedule. E-Learning provides flexibility for lecturers to provide access for students to obtain scientific references related to these courses that may not be obtained during lectures or practicums. All references in the form of scientific writings, popular articles or electronic journals can be provided through e-learning. This is very useful for students, because in addition to strengthening students' understanding of each subject, references from international journals will be very helpful in broadening students' horizons as well as improving students' English skills.

Teuku Fadjar Shadek's research which states that the use of E-Learning information systems can support lecture activities, both for accessing courses and assignments, and can also improve the quality of learning processes and outcomes. E-learning media is proven to improve student learning outcomes [8]. This is evident from the results of research by Mufidatul Islamiyah that the use of E-learning is effective for improving student learning outcomes, as evidenced by the difference in scores of increasing pretest to posttest [9]. Elis Hernawati stated that the application of E-Learning content can increase student interest in learning and the test results on interest in E-learning material content on average show a positive response [10].

Oriented to web-based teaching materials supported by some of these researchers, as well as the availability of easy internet access to implement E-learning can be one solution to answer the challenges of the world of education in the era of the industrial revolution 4.0.

2. METHODS

The research conducted is a type of research and development or Research and Development (R & D). The product developed is a web-based teaching material in the evaluation course of physics learning. This learning media development model uses ADDIE (Analysis, Design, Development and Implementation, Evaluation) which was adapted from Branch [11]. Research on web-based teaching materials was carried out at the Department of Physics Education Masters which is located at Jl. William Iskandar Pasar V Medan Estate, Medan. The research was carried out in the odd semester of the 2019/2020 school year. The population in this study were all students of the Master of Physics Education Study Program in the odd semester of the 2019/2020 school year and the sample in this study was Executive class B 2018.

The product development concept used by the researcher is the research and development concept or abbreviated as (R & D). The research and development concept used is the ADDIE development by Robert Maribe Branch. Researchers used all the available stages because this study aims to find out how far the effectiveness of the web-based teaching materials that have been developed. The stages in this research are Analysis, Design, Development, Implementation and Evaluation. The instruments used in this study include learning instruments and data collection instruments.

3. RESULT AND DISCUSSION

Research Development of research that produces web-based teaching materials. The development stage uses the ADDIE design adopted from the Branch which must go through 5 stages, namely analysis, design, development, implementation, and evaluation to answer research questions. The results of the analysis of the data obtained indicate that the web-based teaching materials developed are declared to be of high quality because they meet the three indicators that are valid, practical, and effective.

3.1. Validity of Web-Based Teaching Materials

The validation of web-based teaching materials is carried out so that the products developed are valid and suitable for use. Validation was carried out by material experts and media experts. The aspects of the media assessment that were assessed were the use of media, the suitability of the material, the appearance of the media, while the aspects of the material that were assessed were the use of media, contextual assessment, the feasibility of the display, the feasibility of the content. The results of the validity assessment by media experts shows that from all aspects assessed obtained an average of 93.33 with valid and usable categories. Revisions were made to produce e-learning-based learning media, namely the front menu such as assignments, tests, and grades so that they appear after logging in. The revised results of web-based teaching materials are in accordance with the improvements from media experts, then the media is validated to material experts using a material validation sheet.

The results of material validation show that web-based teaching materials obtained an average of 95.57 with valid and usable categories. Revisions made to produce valid web-based teaching materials added a video conference link to the material menu. Validation results based on data that have been described by media and material experts are in the valid category and can be used.

Validation results based on data that have been described by media and material experts are in the range of 93.33% - 95.57% with valid and usable categories. According to Akbar, the media is declared feasible if the interpretation results are in the range of 70-95 with a valid category and can be used. Meanwhile, according to Valid according to Rochmad it can be seen from the

products produced and related consistently between one another (material) [12]. Web-based teaching materials that have been assessed by validators have improved both in terms of content and constructs so that they are suitable for use in the learning process. Valid web-based teaching materials used in the learning process increase students' understanding of the evaluation of physics learning.

3.2. The Practicality of Using Web-Based Teaching Materials

Web-based teaching materials that have been valid are used by lecturers and students to see the level of practicality of using the products developed. The level of practicality is viewed from the usability and convenience of lecturers and students in the use of the developed product [13]. The assessment carried out by lecturers as users of web-based teaching materials reached 95.77% in the very practical category. The practical results obtained are a combination of several elements, namely the lecturer has no difficulty in operating the learning media, can be repeated according to the wishes of the user, students are able to understand the material, are able to grow their own knowledge, can control the accuracy of students' learning and are very in accordance with world of students. The learning media developed are practical, interesting, easy, and provide benefits when implemented in the learning process [14].

The practicality of a teaching material can be seen from a product used by lecturers, students and other experts without experiencing difficulties, besides the products developed have appropriate implementation. Teaching materials developed are said to be practical if they are feasible to be applied in the field, which shows the response of teachers, students and other users who find it easy to use learning media to understand the material.

Student responses in practicality are needed in the use of teaching materials. Practical data collection by giving questionnaires to students who are filled in after using learning media. The questionnaire was given to students twice, the first trial involved 5 students while the second trial involved 9 students. The results of the small group trial showed that the web-based teaching materials developed were in the very practical category (86.68%) while the test results in the large group obtained an average of 95.81% in the very practical category. The results of the overall analysis related to the practicality of using web-based teaching materials show that teaching materials are very practical to use in the learning process. The practicality of using web-based teaching materials is a combination of several aspects to make it easier for students to understand the evaluation of physics learning.

3.3. Effectiveness of Web-Based Teaching Materials

The effectiveness of the developed web-based teaching materials is related to formative evaluation. The evaluation carried out is to measure the level of

effectiveness of a teaching material. The level of effectiveness is measured by a numerical scale based on certain criteria. The effectiveness of web-based teaching materials is viewed from the consistency between the curriculum and the products developed and the learning objectives achieved. Consistency is seen from the learning outcomes of students in large and small groups after using web-based teaching materials.

The results of the post-test of small and large groups of students are consistent in achieving learning objectives with a minimum classical completeness of $81\% < KB > 100\%$. Classical completeness obtained by a small group followed by 5 students with an average of 85.20 while in a large group followed by 9 students an average of 88.55 was obtained. The media is classified as effective if the presentation of students' learning completeness is $>85\%$ classically so that the media is declared effective and can be used in field trials and has met the criteria for very good effectiveness.

A teaching material is declared effective if the learning objectives are achieved with the percentage of learning mastery or the achievement of student learning objectives $> 85\%$ classically so that the teaching materials are declared effective in a limited way, can be used in field trials and have met the criteria for very good effectiveness. Riasti et al [15], that there is a relationship between the level of effectiveness with the criteria of interactive learning media in terms of convenience, usefulness, and attractiveness. Effectiveness and flexibility in learning can be increased with web-based teaching materials because with online learning, learning can be done anytime and anywhere, in this way learning is more effective and flexible because it is not only obtained in lecture hours whose time is only short and limited time.

3.4. Improving Student Learning Outcomes Using web-based teaching materials

Gain score data analysis was carried out to determine the effect of using teaching materials on the evaluation of physics learning by using normalized gain [16]. The gain score result, the difference between the pretest and posttest scores, obtained an average gain score in the small group of 0.70 in the high category, while in the large group it was 0.75 in the high category. The increase in student learning outcomes is due to the use of interesting web-based teaching materials so as to improve students' cognition.

Teaching materials that attract the attention of students make it easier for students to remember lessons [17]. The use of web-based teaching materials in the learning process can encourage new desires and interests, foster motivation and stimulation of learning activities, and bring psychological effects on students. Teaching materials help learning activities that are not obtained correctly and help develop what is already ideal to be able, meaning that the content in the learning media for the evaluation of physics learning is very much in accordance with the competencies that must be

achieved by students so that the acquisition of learning outcomes can be maximized with science [18].

The use of media in the learning process has been done before, including Zulhelmi et al, who concluded that the use of web-based teaching materials in learning can improve students' critical thinking skills with a gain score in the high category. Junianto et al, concluded that the use of teaching materials in the learning process can improve student achievement with a moderate gain score [19].

The results of product development through 5 stages, namely analysis, design, development, implementation, and evaluation obtained quality web-based teaching materials that are according to valid, practical and effective indicators. Quality learning media can be used as an alternative as a source of learning physics, especially in physics learning evaluation courses.

4. CONCLUSION

There is a significant difference between the Based on the results of the analysis and discussion that have been described, it is concluded that the web-based teaching materials developed with the ADDIE design are included in the valid category by media experts; Web-based teaching materials developed with the ADDIE design are categorized as very practical by lecturers; Web-based teaching materials developed with the ADDIE design are effective in terms of the use of learning media; The level of student learning outcomes using web-based teaching materials developed with the ADDIE design has a complete category; and Level of interaction Web-based teaching materials developed with ADDIE design on student learning outcomes in the high category.

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