

[Research Article]

DEVELOPMENT OF PHYSICS LEARNING WEB BLOG BASED ON CONTEXTUAL TEACHING LEARNING (CTL)

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ABSTRACT

This study aims to construct and validate and analyze the effectiveness of a physics learning blog based on contextual teaching and learning. The method used in developing a physics learning blog is the ADDIE model. The physics learning blog was validated by material experts, media experts, and one physics teacher as a practitioner. The validation and practicality tests show that the module developed is valid and practical to use as a medium to increase students' learning motivation. The effectiveness test results using a one-class pre-test and post-test design showed increased student motivation before and after using a web blog. The learning web blog generated from this development research can be used as one of the teaching components specifically aimed at increasing students' learning motivation.

Keywords: ADDIE model, contextual teaching and learning, web blog

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1. INTRODUCTION

Physics is one of the branches of science taught at the high school level in Indonesia. As stated in the 2013 curriculum, one of the objectives of learning physics is to master concepts and principles and have the skills to develop knowledge and self-confidence as a provision to continue education to a higher level (Mohandas et al., 2014). Furthermore, Mohandas et al. (2014) stated that physics learning emphasizes processes or methods, products, attitudes, and technology to support the achievement of a complete understanding of physics concepts. But in reality, this learning goal is often difficult to achieve.

The characteristic of physics knowledge, which mainly consists of abstract concepts and requires idealization through mathematical modeling, makes physics recognized as a branch of science that is difficult to learn and teach (Jääskeläinen & Lagerkvist, 2017; Mulhall & Gunstone, 2012). Research shows that problems that often arise in learning physics are:

- Lacking motivation and active involvement of students in studying physics (Potvin & Hasni, 2014).
- Low understanding of students' concepts (Farrokhnia, Pijeira-Díaz, Noroozi, & Hatami, 2019).
- Insufficient problem-solving skills students (Abdin, Sukariasih, Takda, & Sahara, 2020).
- The emergence of student misconceptions in various physics topics (Maison, Safitri, & Wardana, 2019).

Researchers prove that learning media innovation plays an essential role in overcoming various problems in learning physics (Abdin et al., 2020; Afrilia, Rusli, Tanti, Mutamasikin, & Yusuf, 2021; Eveline, Suparno, Ardiyati, & Dasilva, 2019; Tanti, 2020). Information technology such as the web is a good choice for implementing learning. Today, the web is no longer just a medium through which information is transmitted and consumed but has shifted to become a platform where content is created, re-mixed, and shared

(Garcia, Moizer, Wilkins, & Haddoud, 2019). Furthermore, García-Martín and García-Sánchez (2013) state that web 2.0 is a platform that allows users to collaborate, connect, and participate in a learning community.

A web blog, often known as a blog, is one type of web 2.0 application that is frequently utilized. Blogs are personal online pages written in chronological sequence and created with particular software to help with the administrative process (Luján-Mora & de Juana-Espinosa, 2007; Tang, Tang, & Chiang, 2014). Blogs are becoming increasingly popular in online communities, where bloggers can contribute original material, media (pictures, videos, and audio), and even learning experiences with others (Te Wang, Huang, Jeng, & Wang, 2008). According to Oullette (2021) research, the global number of blog users is growing. Every month, 490 million individuals access over 20 billion blog pages, and readers contribute 77 million new blog comments. Based on the frequency with which this blog is used, blogs have a great potential to be used as learning media due to their open nature, the convenience of use, and support for successful collaboration and communication (Yuen & Yuen, 2010).

Several studies in education suggest that using blogs as a learning medium is helpful. According to Sawmiller (2010), using blogs encourages students to improve their writing and reading skills. Students must have both of these talents to be critical thinkers. Furthermore, blogs, according to Sawmiller (2010), facilitate organizing and linking material with prior knowledge, which can aid students in developing mastery of scientific concepts. According to Churchill (2011), the blog system can be expanded using many other Web 2.0 apps to optimize learning and teaching potential. According to Xie and Sharma (2011), blogs expose users to people from diverse backgrounds and circumstances, promoting the development of students' metacognitive techniques.

Although blogs are regarded as one of the most acceptable ways to integrate information

technology (ICT) with teaching and learning approaches, their use in teaching physics at the high school level remains limited, particularly in studying physics in Jambi City. According to a survey done by researchers on twenty physics teachers in Jambi City and Merangin Regency regarding the frequency of using media in learning, 72.73 percent of teachers responded "sometimes," 9.09 percent said "rarely," and 27.27 percent said "frequently." Meanwhile, 100% of teachers reported using information technology-based learning resources.

Research conducted by Gilbert, Bulte, and Pilot (2011) explains that in physics learning, facts and concepts are often taught isolated from what students experience in everyday life. This way of teaching causes students to fail to get a mental model of the physics material being studied. As a result, students fail to transfer the knowledge they have learned, as evidenced by the inability of students to solve physics problems that have a different context from the example questions given by the teacher. Based on this fact, an innovative instructional approach is needed based on the context of students' lives, better known as contextual teaching and learning (CTL).

According to Diani and Syarlisjisman (2018), using innovative media combined with selecting appropriate pedagogical methods will positively contribute to the success of students studying physics. Contextual teaching and learning (CTL), based on the constructivist paradigm, is a reasonably popular learning design used in physics learning (Dewi & Primayana, 2019). Research by Rahmawati, Supardi, and Sulistyaningsih (2019) proves that CTL-based education significantly affects active participation and the development of students' critical thinking skills. Furthermore, Dewi and Primayana (2019) stated that CTL is an approach to presenting knowledge by confronting students with solving problems they encounter in everyday life.

2. METHOD

This research is a type of development research. According to Richey and Klein

(2014), development research is a systematic study of the design, development, and evaluation process that aims to build an empirical foundation for creating instructional and non-instructional products, as well as new models or models are enhanced for their development. This development study was conducted at SMAN 6 Merangin in Jambi. The school are chosen based on their use of the updated 2013 curriculum and the availability of computer facilities and internet networks. The development design used is the ADDIE model. The four steps of media development with ADDIE design are analysis, design, development, and implementation. Figure 1 depicts the activity schedule during the ADDIE stage:

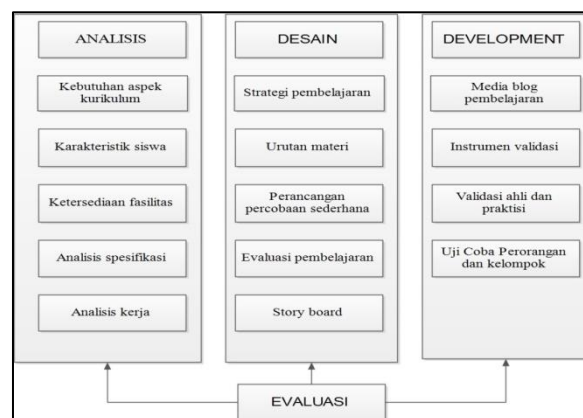


Figure 1. The ADDIE Process

The first step of the analysis phase is identifying problems in learning physics. A needs analysis was carried out using observation, interviews, and questionnaires. The sources of information at this stage are teachers and students. At analysis stage, student characteristics are analyzed along with curriculum analysis, the availability of learning resources, specifications, and work analysis. The next step of development is the design stage. At this stage, researchers make product designs using flowcharts and storyboards.

The development stage is where the development team brings the design to life or manufactures the product. A CTL-based blog planned to be converted into a true learning blog serves as the pattern for physics learning media. The Notepad++ application was used to

create learning media in the form of a blog. The end outcome of product development is in the form of learning resources accessible via smartphone. Physics learning media in the form of a CTL-based blog combines textual subject information with visualization in the form of graphics, animations, and learning videos to motivate students to learn. Product validation is also performed throughout the development stage. According to Rusdi (2018), the generated prototype is assessed by media and design specialists and instructors and practitioners during the development stage. Product testing and assessment are the next activities in the development cycle. The trial phase is a data collection process that assesses the developed product's effectiveness. One-on-one, small-group, and large-group trials were all undertaken.

3. RESULT AND DISCUSSION

The following is a summary of the study's findings:

3.1 Problem Analysis in Learning Physics

This analysis was carried out using field studies through observation and open interviews with physics teachers and five students of class XI IPA 1 at SMAN 6 Merangin. Observations of the learning process were conducted for two days: November 22, 2021, and November 23, 2021. The results showed that teaching and learning activities at SMAN 6 Merangin had utilized learning media, but most of the media used were still conventional. Teaching and learning activities in class XI IPA 1 SMAN 6 Merangin, especially in physics subjects, often use student books and student worksheets (LKPS). Sometimes teachers provide learning videos obtained from YouTube.

However, according to the teacher, these learning videos are ineffective because students are reluctant to open the learning videos given due to limited internet quota. The results of interviews with teachers revealed that during the pandemic, teachers had difficulty monitoring the extent to which

students understood the subject matter. In addition, from the student's perspective, the activity and motivation of students to participate in online learning are very low. Many students are not ready to learn. They often do not do assignments and cannot understand the material being taught to the fullest. When learning takes place using zoom, no students ask questions. Furthermore, the teacher stated that although currently learning has been carried out face-to-face, the use of information technology-based learning media is a priority. Technology-based media can help students learn anywhere and anytime so that learning outcomes can be achieved optimally and effectively.

According to interviews with five students from class XI IPA 1 SMAN 6 Merangin, the biggest challenges encountered in studying physics are the complex formulas and steps required to answer physics issues. Despite their best efforts, most pupils reported that they could not understand physics. Three out of five students reported that their participation in learning activities such as completing homework was motivated more by fear of receiving poor grades than by a desire to understand physics. Students want physics learning to be linked to real-life experiences to better understand the physics knowledge being taught. Students require various learning materials, including learning media, to enhance their interest and motivation to learn.

3.2 The Needs Analysis

The researcher conducted a field study to find out the need for the development of contextual teaching and learning (CTL)-based physics learning blog by distributing media needs questionnaires to teachers and students online using a google form to teachers and students in several high schools in Merangin Regency and Jambi City. Based on the results of filling out a survey of teacher needs for learning media for CTL-based physics learning weblogs involving 11 teacher respondents, it can be seen that 100% of teachers have used information technology-based learning media. Still, the learning media used are videos downloaded

from YouTube. The main reason used by teachers in choosing media is based on the characteristics of the material being taught (72.7%). Making a summary of teaching materials using available applications or software such as power points is the main activity carried out by teachers to support the availability of learning media (54.5%). 75.8% of respondents stated that the learning media of physics weblog is interesting.

Meanwhile, 72.8% of teacher respondents stated the need to use CTL-based physics learning web blog in physics. The teacher needs analysis survey also attached a written question regarding the teacher's obstacles in developing learning media in the form of a web blog. The teacher stated that the main obstacles in using information technology-based media were inadequate facilities and infrastructure and minimal ability to design learning media in the form of blogs.

The distribution of questionnaires to 55 students across two high schools in the Merangin Regency yielded data on the availability of computer labs in schools, which accounted for 79.9% of the overall analysis of student demands. However, 100% of the time, employing weblog media in physics education has not been done. More than eighty-six percent of students surveyed agreed that physics-focused weblogs could help them stay more engaged in their studies. Eighty-two percent of students said they had trouble grasping physics concepts, and 59.7% said that simply listening to the teacher's explanation wasn't enough. Ninety-nine percent of students said they needed to use media in their education, and nearly 96% thought the Physics Learning Media Blog was a valuable resource.

3.3. Media Development

The physics learning blog developed with a contextual teaching and learning approach aims to increase students' motivation to study physics. The media is created using blogger.com as an intermediary between users and teaching materials. Using a blogger as an intermediary also aims to avoid installing other

applications when accessing the product. Therefore, the use of bloggers can be accessed widely. Users need not download any application to access the blog's web media. Product specifications are adjusted to the analysis of problems in physics learning, needs analysis, availability of sources, product development orientation, and product objectives developed by researchers.

No	Noted
1	Create a concept map at the beginning of the chapter so that students get an idea of the material to be studied and how it relates to one another.
2	The narration at the beginning of the explanation attempted to move from the student's daily experiences to fit the applied learning model, namely contextual teaching and learning (CTL).
3	Explain the purpose of the simple investigation in a simple experiment.

In the discussion session with the media validator, significant improvements were made to the toolbar and the blogger theme, which required the development team to code by adding HTML (Notepad++) to create a toolbar that would make it easier for users to access the media. In the second stage, improvements were made to the learning video. The purpose of presenting learning videos is to fulfill the modality principle, which is part of the multimedia design for learning, as stated by Richard and Mayer (2009). According to Richard and Mayer (2009), students can learn better from a combination of animation and narration. Images and sentences that are presented visually will cause the visual channel to be overloaded while the auditory canal is not used.

Therefore, in the development of multimedia, visual and auditory aspects are used in a balanced way. Previously, learning videos were adopted from the Youtube platform. Based on the results of the expert evaluation, the learning objectives were not implied in the learning video before the revision. Experts recommend using videos that relate to everyday life. Thus, the information displayed can make students better understand the

material. According to media experts, weblog media can be used for the actual ++validation is carried out to evaluate the improvements that have been carried out after the second validation. The expert stated that contextual teaching and learning-based weblog media assisted by Notepad++ software were valid and worthy of use.

3.4. Trial and Evaluation by The Teacher

The teacher, as a practitioner, evaluates the product developed, namely a physics learning web blog based on contextual teaching and learning. The teacher assesses aspects of the accuracy of the material, good media design, and ease of use. Teacher assessment is done by filling out teacher response questionnaires and interviews. The results of the teacher response questionnaire analysis are presented in Figure 2.

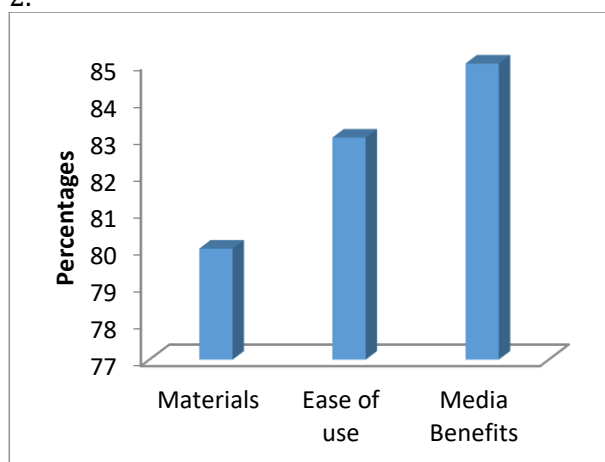


Figure 2. Teacher Response Analysis

Based on Figure 2 above, it can be seen that teacher practitioners' assessments of the three assessment aspects, namely the accuracy of the material, media design, and ease of use, are in the excellent category, with an average percentage of achievement of 81.67%. The results of interviews with teachers revealed that the web blog media developed was following the revised 2013 curriculum. According to the teacher, using this web blog can be an attractive alternative source of learning physics for students. In addition, the teacher stated that physics learning materials were packaged in blogs with sentences that were easy to understand and associated with

events that were easily found in everyday life. This learning approach will help students to be able to construct their knowledge as a whole.

3.5. One-on-one Trial and Evaluation

The purpose of the one-on-one trial is to dig up information about the product, including the clarity of the material, the convenience, and the benefits of the product being developed. One-on-one trials were conducted with three students of class XII IPA who had different academic abilities (low, medium, and high). The three students were asked to use the product and evaluate the product using a questionnaire sheet. The results of one-on-one trials can be seen in Figure 3.

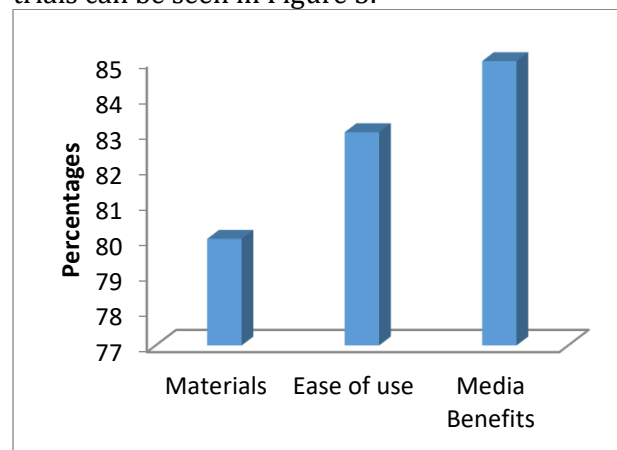


Figure 3. One-on-One Response Analysis

Based on Figure 3 above, it is concluded that the student's responses to the media in the form of physics learning web blogs are in the excellent category, with an average percentage of performance in three aspects (material, ease of use, and media benefits) of 79.67%. The performance aspect with the highest achievement is in the comfort of use dimension, which is 83%. According to students, weblogs are easy to use because the existing features are easy to access.

3.6. Small Group Trial and Evaluation

Small group trials were carried out on ten students of class XII science who had previously studied rotational dynamics and rigid body equilibrium. Before learning begins, the researcher demonstrates how to access media through the blogspot.com platform on Google Chrome. Next, students are directed to

create a blogger account so that they can provide comments or arguments on each available post. Observers observe student activities to discover potential problems or obstacles when accessing media. At the end of the lesson, the researcher conducted interviews with students to find out students responses to the media. The interview guide was developed from a questionnaire of student responses to trials and one-on-one evaluations.

The observer's observations show that students can use learning media well. This success is based on several indicators: students can log in smoothly, students' proficiency in operating menus on blogs, and students' success in filling out biodata during registration. Students stated that the use of weblog media was fascinating and complex. Students realize that each post has its function. In addition to flexibility, weblog media responded positively to providing new learning experiences for students in physics. Students stated that the color combination was quite good and did not interfere with the reader's comfort. In addition to color variations, students commented on the material description, and learning videos were presented briefly and clearly. The interview guide was developed from a questionnaire of student responses to trials and one-on-one evaluations.

3.7. Large Group Trial and Evaluation Results

The trial and evaluation of large groups aim to determine the effectiveness of using a physics learning web blog based on contextual teaching and learning to increase students' learning motivation. Large group trials and evaluations were conducted in class XI IPA 1 SMAN 6 Merangin. Before the test and evaluation were carried out, the researcher discussed with the physics subject teacher the stages of learning that would be carried out. The effectiveness of using media in large group trials uses a quasi-experimental pre-test and post-test control group design. The results of the analysis of learning motivation before and

after being given treatment can be seen in Figure 5.7. below this:

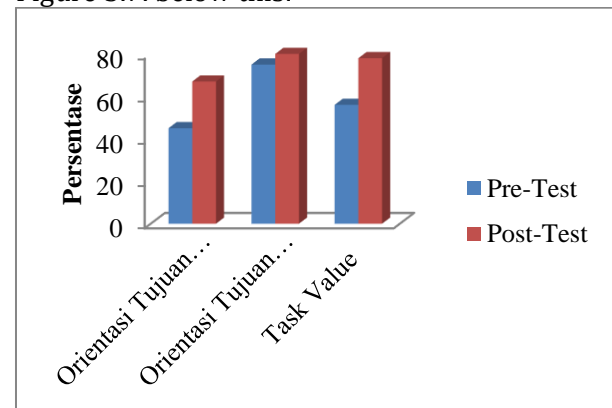


Figure 4. Student learning motivation before and after using blog

The students' learning motivation instrument in this study consisted of three dimensions: intrinsic goal orientation, extrinsic goal orientation, and task value. The dimensions of intrinsic goal orientation and task value have a reasonably substantial percentage difference in achievement. The intrinsic goal orientation dimension measures the extent to which students are involved in learning activities due to internal factors such as challenge, curiosity, and mastery of the material. On the other hand, task value describes students' perceptions of how important and exciting the task given by the teacher is (Pintrich, 1991). The high percentage increase in achievement in these two dimensions is because students can have a good qualitative understanding before solving problems mathematically through blogs. This result is in line with the statement of Sawmiller (2010), which states that blogs are not only a tool for finding information but can help students:

1. Understand the concept of lessons.
2. Improve the quality of learning because students can learn according to their learning styles.
3. Develop critical thinking and collaboration skills.
4. Bridging between learning at school and home.

4. CONCLUSION

Using web blogs based on contextual teaching and learning can significantly increase

students' motivation to study physics. Module improvements such as image display, font size, and content still need to be refined to make them easier to use in the learning process. In addition, it is necessary to develop a web blog based on contextual teaching and learning on other physics topics.

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