Developing blog-based learning media for basic mechanical engineering subjects

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Abstract This research aims to develop a blog as learning media, analyse the instrument of feasibility test for the blog, and examine the students’ and teachers’ responses to the developing learning media used in basic mechanical engineering subject conducted in vocational high schools of PIRI Sleman and PIRI 1 Yogyakarta. This research employed the research and development method. The data of this study were collected using questionnaires. The results of the study show that this study develops learning media in the form of a blog consisting of six necessary competences of Basic Mechanical Engineering and a website namely https://pdtmsmk.blogspot.com which can be accessed through a gadget anytime and anywhere. In addition, the researchers conduct the feasibility test is readily used and the media go through field tests, and from the tests, a very high score is obtained and that is the blog is feasible.

1. Introduction
Vocational High School (VHS) is a secondary education that prepares students primarily to work in specific fields, such as Mechanical Engineering. Thus, the VHS students in the Mechanical Engineering Department are trained to become professionals in the field of Mechanical [3]. They are demanded to not only develop their cognitive competence since students’ psychomotor aspect which is closely related to skills, also need to be developed in VHSs. Mechanical Basic Mechanical Engineering is one of the subjects provided for students in the Mechanical Engineering Program. The subject is essential since it develops students’ both cognitive and psychomotor aspects. Learning processes in Basic Mechanical Engineering subject present knowledge in the form of theories and skills in the form of practices. These competencies are presented separately but are interrelated with each other [4].

Thus far, most of the teachers of VHS of PIRI Sleman and PIRI 1 Yogyakarta teach using the lecture method where whiteboard and books are used to present the materials in front of the class. Meanwhile, what the students do is merely writing and listening. The teaching-learning process seems ideal and reasonable. However, when given a chance to ask, none of the students asks a question. One of the causes is that the students do not know what to ask. Also, they do not understand the materials presented. Besides, most of them often forget the names of machine components and procedures of using the equipment during practicums in workshops.

The use of learning media is essential in the teaching and learning processes because more interesting media will improve students’ interest, motivation, and activeness during the learning process [5]. Besides, learning media that are relevant to the learning objectives will help obtain the competencies
intended by the students [6]. Besides, the students will get a lack of learning experiences if the lecture method is employed with only whiteboard and books as the learning media.

VHS of PIRI Sleman and PIRI 1 Yogyakarta are technical vocational high schools that have been accredited A. Each class in both schools is equipped with liquid crystal display (LCD) projector and viewer to support the learning processes. Some areas of the schools are within the range of the wi-fi network that is connected to internet. Thus, the students may bring smartphones to find information on new materials presented by the teachers. However, there are a few teachers make use of the facilities. If the teachers can use the LCD projector and viewer as the learning media in Basic Mechanical Engineering learning, the learning processes will be more enjoyable.

Therefore, there is a need for computer-assisted media which use the LCD projector, viewer, and wi-fi connection to present texts, images, and animation. The learning media will help students obtain more knowledge, understandings of concepts, and knowledge on how the theories being learned should be implemented. A blog may be used as the learning media.

A blog is one of the existing media to be used in learning. Blogs can also be employed as learning resources where teachers upload materials discussed. The use of a blog as learning media will help and facilitate students to obtain the materials presented by the teachers according to their own needs [7].

One of the advantages of a blog is that it serves as a medium for the writing subject. It can also be the most natural and most strategic media for publishing works. As a media for a learning tutorial, it can establish communication and interaction among communities. The other advantage of a blog is that it is feasible to be developed with the human resources and facilities available in those two vocational high schools.

This study aims to develop additional learning media in the form of a blog for Basic Mechanical Engineering subject in vocational high schools PIRI Sleman and PIRI 1 Yogyakarta; analyse and translate the results of the feasibility test for developing the media used in Basic Mechanical Engineering subject, and examine the students’ responses after the blog is used during learning processes in both VHSs.

2. Method

This research employed the research and development method, which is also known as R&D. The research stages by Borg and Gall were used in this research. There are ten stages of research and development according to Borg and Gall, but this research implemented 6 of the ten stages because the stages should be by the researchers’ capabilities in terms of time and funding. Besides, the researchers focus only on the feasibility test assessed by the experts and the function of the developed media as new learning media. The limitation was based on the suggestions provided by Borg and Gall that on a small scale, the research stages need to be limited.

The participants of this study were experts at learning media and teaching materials as well as teachers and tenth-grade students. There were thirteen students of XM Class from vocational high school PIRI Sleman and 24 students of XM Class from vocational high school PIRI 1 Yogyakarta, so there were supposed to be 37 students in total. However, only 30 students were coming into the field test at that moment. Thus, those students were the only population of this research. The research object was a blog used as learning media in Basic Mechanical Engineering subject.

The data were collected through observations, interviews, and surveys. The observations were conducted to analyse students’ learning needs and the XM class students’ real condition. The interviews were done to obtain a preliminary analysis of the obstacles, problems, and materials presented in the Basic Mechanical Engineering subject. The data were then analyzed using the quantitative descriptive technique, which presented the developed media after field testing was conducted. The technique measures the media feasibility to be implemented in Basic Mechanical Engineering subject. The obtained communicative data were processed based on the intended total number and the percentages would be obtained (see Table 1 or formula one below) [8].
Feasibility Percentage (\%) = \frac{\text{feasibility score (x)}}{\text{the highest score (y)}} \times 100 \quad (1)

The collected data were analysed using the quantitative descriptive analysis technique before presented in the score distribution and percentages of each assessment category that had been determined in table 1. After presenting the data in the form of percentages, the researchers described and concluded each indicator.

| Percentage    | Scale | Interpretation |
|---------------|-------|----------------|
| 76 – 100%     | 4     | Excellent      |
| 56 – 75%      | 3     | Good           |
| 40 – 55%      | 2     | Fair           |
| 0 – 39%       | 1     | Poor           |

3. Result and Discussion

The planning stages conducted using the online blog learning media. This aims to help all students to access the learning media anywhere and anytime. The format of media development employed free blogspot sites. The design of the blog is presented in figure 1.

Figure 1. The design of the blog learning media

The third stage of development is designing the initial design of the blog entitled Basic Mechanical Engineering Work. The design shows the choices of sub menus leading to the materials presented, home menu showing core competences and basic competences, and an image of gears as the background. The blog contains the materials on basic competency 3.1 to the basic competency 3.6. In the reference part, the researchers put the resources used during the media development. In the “about the author” part, the researchers write their profiles. After developing the initial product, the product goes through media validation and material validation.

The fourth stage is the initial field testing, where the researchers conduct limited field testing. Feasibility questionnaires are distributed to two teachers and ten students of XM class from both schools. The next stage is product revision, where the learning media go through several revisions by the inputs provided by the teachers and students during initial field testing. Both teachers can provide inputs in the form of suggestions, but the students do not provide any because they feel happy and seemed enthusiastic about the idea of a Blog as learning media.
The last stage is the first field test which is supposed to involve 13 students of XM class of vocational high schools PIRI Sleman and 24 students of XM class of vocational high school PIRI 1 Yogyakarta. However, only 30 students are coming in main field testing. Eleven of them are from VHS PIRI Sleman and 19 of them are from VHS PIRI 1 Yogyakarta.

The feasibility test by two different media experts is carried out twice. The aspects evaluated are design, function, convenience, interaction, and navigation. The percentages of feasibility value from the experts are processed using the formula mentioned in the previous part. The results of the first stage show that the feasibility score given by the first expert at media is 63, with an average score of 3.15. Meanwhile, at the second stage, the feasibility score given by the first media expert is 71 with an average score of 3.23 and the feasibility score of 81%. The score given by the second media expert is 76 with an average score of 3.46 and the feasibility score of 86%. The scores indicate that the media are excellent.

3.1. Feasibility assessed by material experts
The feasibility test by two different media experts is carried out twice. The aspects evaluated are design, function, convenience, interaction, and navigation. The percentages of feasibility value from the experts are processed using the formula mentioned in the previous part. The results of the first stage show that the feasibility score given by the first expert at media is 63, with an average score of 3.15. Meanwhile, at the second stage, the feasibility score given by the first media expert is 71 with an average score of 3.23 and the feasibility score of 81%. The score given by the second media expert is 76 with an average score of 3.46 and the feasibility score of 86%. The scores indicate that the media are excellent.

3.2. Feasibility assessed by teachers
The feasibility test by the teachers is based on aspects related to the material quality, the function of the media, the design of the media, and the media operation. The feasibility test is carried out during the initial field test on March 18, 2019, by two teachers from two different VHSs. The feasibility test by the teachers shows similar results. The total score is 47 with an average value of 3.61. After converting to the percentage scale, the final percentage is 90% which means that the media are excellent.

3.3. Feasibility assessed by students
The feasibility test by students was based on some aspects, namely the material quality, the function of the media, and the design of the media. The feasibility test is carried out by researchers during the initial field test on April 10, 2019. It involves ten students from both VHSs. The results of the feasibility test with students show that the total score is 340 with an average score of 34. After being converted to the percentage scale, the final percentage is 85% which indicates that the media are excellent.

3.4. The result of test to students
The results of testing to students are obtained by researchers from the main field test stage. The researcher show and explain about the developed blog media to students on April 24, 2019, in the XM class of vocational schools Sleman PIRI and PIRI 1 Yogyakarta. From this test, it is found that students are enthusiastic in learning using the Blog-based learning media. This is proven by the questionnaires filled out by the students. The percentage of feasibility is 85%, which means that the media are excellent.

The results of this study show that the Blog which is assessed by media experts, material experts, teachers, and students, is excellent learning media to be used in VHSs. The result of the final feasibility test is presented in figure 2.
4. Conclusions

The result of the research and development is a blog which functions as learning media containing six basic competencies of the Basic Mechanical Engineering subjects. The blog is enthusiastically responded by the students and teachers in vocational high schools PIRI Sleman and PIRI 1 Yogyakarta. The feasibility test for the blog-based learning media shows that all assessors consider the blog feasible excellent. The percentages are 81% from the first media expert, 86% from the second media expert, 84% from the first material expert, 87% from the second material expert, 90% from two teachers, and 85% from the students. The initial and primary field tests for the blog show that the teachers and students think that the learning media are excellent. The results obtained from students in the main field test stage gain a percentage of the feasibility of 85%.

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