



Development of Web-Based Geography Learning Media for High School Students

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ABSTRACT

Purpose of the study: This research aims to address the low student learning outcomes and motivation in the geography learning subjects of students at higher school by developing and evaluating a web-based geography learning media using Moodle and examining its effectiveness in enhancing the student learning achievement and interest.

Methodology: This research uses a R&D method development procedure with six steps. The research subjects are 21 students in higher school. The data collection technique is a test using a before-after experimental design.

Main Findings: The research data shows that the web-based geography learning media using Moodle is effective and suitable for use. The validation by geography subject matter experts shows that the learning media material has a very good quality with an average score of 92.5%. The media validation results show that the learning media is very good and suitable for application in the learning process with an average score of 66.2%. The results of the test using a before-after experimental design show that the learning media can improve the student learning outcomes with a significant difference of $t_{count} > t_{table}$, namely $5.570 \geq 2.086$, exceeding the expected outcome of 75%.

Novelty/Originality of this study: Develop and evaluate a web-based geography learning media using Moodle for the geography learning subjects of higher school, which may have different characteristics and needs from other students in other regions or countries. The research has implications for the improvement of the geography curriculum and the teacher training program in higher school.

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1. INTRODUCTION

Education is a conscious and systematic effort carried out by people who are entrusted with the responsibility to influence students to have characteristics and habits in accordance with educational ideals [1]-[6]. Education is leadership that is given deliberately by adults to children. children, in their growth (physical and spiritual) so that they are useful for themselves and for society. In another sense, education is the maturation of students so that they can develop their talents, potential and skills in living life, therefore education should be designed to provide understanding and improve students' learning achievements.

Student learning achievement at school is often indicated by the student's learning problems in understanding the material. This indication is possible because students' learning factors are less effective, even students themselves do not feel motivated in participating in class learning, causing students to lack or even not understand the difficult material given by the teacher. This tendency towards less interesting learning is a normal thing experienced by teachers who do not understand the needs of these students both in terms of characteristics and in developing knowledge [7]-[11]. In this case the role of a teacher as a knowledge developer is very large in selecting and implementing appropriate and efficient learning for students are not just conventional-based learning. Good learning can be supported by a conducive learning atmosphere and communication relationships between teachers and students that can run well.

The problem of education and teaching is a quite complex problem where many factors influence it. One of these factors is the teacher. The teacher is a teaching component that plays an important and main role, because the success of the teaching and learning process is largely determined by teacher factors. The teacher's task is to convey lesson material to students through communication interactions between the teacher and the students. Poor communication has consequences for the message given by the teacher. The communication process always changes according to the times and advances in science [12]-[15].

Advances in science and technology have influenced the use of teaching aids in schools and other educational institutions. For schools that are capable and advanced, they have used these tools as teaching aids, so that learning becomes more effective and efficient [16]-[21]. With advances in technology, the development of education in schools is increasingly undergoing changes and encouraging several change efforts. Nowadays, learning in schools is starting to be adapted to developments in information technology, resulting in changes and shifts in educational paradigms. Rapid developments in the field of information technology, especially the internet, are accelerating the flow of science that penetrates the boundaries of the dimensions of space, bureaucracy, establishment and time. Internet programs not only display data and information that can be transmitted at high speed, but also knowledge that can be accessed quickly by its users. Capability, speed, The opportunity to accumulate, process, analyze and synthesize data into information which then becomes useful knowledge is very important in today's information world. Of course, this condition has an influence on the educational habits and culture that have been managed and carried out so far.

The progress and role of technology has become increasingly prominent, so that the use of teaching aids, educational, audio, visual and audio-visual aids as well as school equipment and other work equipment is adapted to these developments [22]-[25]. But what needs to be paid attention to is that all school equipment and supplies must be adapted to the demands of the curriculum with the materials, methods and level of ability of learners (students) to achieve learning goals. The development of information technology has influenced the use of various types of media as aids in the learning process. So teachers are expected to be able to use these tools or equipment effectively and efficiently in classroom learning.

The current learning system is generally still dominated by the lecture method and there is no media to support the learning process. It is often found that in learning teachers only use monotonous learning methods, so that teachers cannot develop interesting learning. And sometimes not all of the subject matter can be delivered due to limited time and space which is limited to the classroom alone. To realize quality learning, comprehensive efforts need to be taken to improve teachers' ability to use the internet as a learning resource. However, based on developing issues in education, learning in schools is not yet running effectively, and many teachers even teach without utilizing learning resources. . They teach routinely as is so that learning seems monotonous.

With this web-based learning model, it is not limited by the large number of students and at the same time in different places, even over long distances, they can exchange information and communicate. What this technology offers is speed and unlimited access to place and time, so you can access it anytime and anywhere. The aim of this research is to explain the effectiveness of the web-based geography learning model at higher school and to produce web-based geography learning media products at higher school that are suitable for application as geography learning media.

2. RESEARCH METHOD

This type of research is product-oriented development research in the field of education. According to Sugiyono, development research is research used to produce certain products and test the effectiveness of these products [26]. Development research is a process used to develop and validate educational products [27]. Development research, as distinguished from simple learning development, is defined as a systematic study to design, develop and evaluate programs, processes and learning outcomes that must be meet the criteria for internal consistency and effectiveness.

A model is defined as a conceptual framework that is used as a reference in carrying out activities. According to Punaji, there are two development models, namely the conceptual model and the procedural model. A conceptual model is an analytical model that provides or explains the components of the product to be developed and the relationships between the components.

In this development research, the author refers to the development research guidelines according to Arief S. Sadiman et al with the following research sequence.

1. Analyze students' needs and characteristics (determine the objectives of the program or product to be developed).
2. Formulate instructional objectives with typical operations.
3. Formulate detailed material points that support the achievement of objectives.
4. Develop a tool to measure success.
5. Write media scripts.
6. Conduct tests and revisions.

The procedural steps in research and development of learning media are in line with Nana Syaodih's description of procedures for implementing development research, namely descriptive, evaluative and experimental methods. Descriptive research methods are used in initial research to collect data about existing conditions, including:

1. Condition of existing products as a comparison or basic material for the product to be developed.
2. Conditions of users such as schools, teachers, students and other users.
3. Conditions of supporting and inhibiting factors for the development and use of the products to be produced, including human elements, facilities and infrastructure, management

Based on the learning media development approach model according to Arief S. Sadiman et al as mentioned above, the development procedures in this development research follow the steps instructed in the design model as follows.

In the first step in analyzing students' needs and characteristics, what the researcher did was examine the situation in the classroom with the aim of finding out whether the development of learning media in the form of a web was needed. At this stage, observations were made in class XI Social Higher school. From the results of observations and interviews, information was obtained that Geography teachers do not use a variety of learning media, due to the lack of learning media at the school, especially web media. The majority of geography teachers only apply the lecture, question and answer, assignment method so that the learning atmosphere is less effective and efficient and less interesting. Based on the results of these observations and interviews, it was determined that it was necessary to provide geography learning media to improve students' understanding of the subject matter, namely in the form of developing web-based geography learning media. The next step to analyze student needs and characteristics was to identify geography learning objectives. This step means determining what students want to be able to do after participating in learning activities.

Geography learning objectives are a formulation of the abilities or behavior that students are expected to have after participating in geography learning. These abilities or behaviors must be formulated specifically and operationally so that they can be observed and measured. Thus, the level of student achievement in the behavior contained in the specific learning objectives can be measured with tests. The next step after the material points have been formulated is to develop a success measuring tool. In this case the researcher used a test before treatment (appendix X) and a test after treatment (appendix XI). Test before treatment is a test given to students after the lesson has been delivered using normal teaching methods or without using media (test before using web learning media). Meanwhile, the after treatment test is a test given to students after being given different treatment, namely using web learning media). Apart from the two tests given to students, the other research instrument is a questionnaire given to teachers, students and validators consisting of lecturers who are competent in the field of material and competent in the field of learning media design. These questionnaires were used to determine the suitability of web learning media as a geography learning media.

At this stage, the media is designed according to what will be developed, namely web-shaped learning media. The media design is adapted to the material and is designed to be as attractive as possible so that students are motivated to learn and are active in learning activities. This web media is equipped with a login page, quiz, forum, material page which includes images and videos as well as a summary of the material. Quizzes are used to measure students' ability to understand learning material. After the web learning media has been designed, tests are then carried out, namely validator tests and trial tests. Validator tests are carried out on material experts and media experts, with material experts being geography lecturers, and media experts being lecturers who are competent in the media field. The validity test was carried out to obtain data that was used to revise the learning media that had been produced. The media that has been revised is then revised to improve the media when used for testing with students. After the media has been tested, another test is carried out on the suitability of web learning media as a geography learning media. This test was carried out on two subjects. Firstly, the material expert test is a teacher in the field of geography and secondly, students become research subjects by filling out a questionnaire.

The instrument used to obtain the expected amount of data will be used as a data collection instrument, namely in the form of a questionnaire, namely a number of written questions used to obtain information from respondents which are used to collect data about the components of web learning media, the accuracy of the design or design of learning media, the attractiveness and effectiveness of using learning media which is then

analyzed and used as a revision. The questionnaire used in this research will be given to validators. Validators include geography subject experts and learning media experts, consisting of geography subject teachers and lecturers who are competent in the fields of geography and learning media. The questionnaire given to validators serves to determine the suitability of web learning media products as learning media.

The data analysis technique used to analyze qualitative data from validation results is by calculating the average value. The calculation function is to determine the final value ranking for the item in question. The formula for calculating the average value is as follows [8].

$$P = \frac{\sum x}{\sum xi} \times 100$$

Information :

P = Feasibility

$\sum x$ = Number of assessment answers

$\sum xi$ = Highest number of answers

After analysis, to determine the conclusions from each aspect of the assessment can be seen in the following table:

Percentage (%)	Validity Criteria
76 - 100	Valid
56 - 75	Fairly Valid
40 - 55	Invalid (Revised)
0 - 39	Invalid (Revised)

If the assessment results of the product being developed reach 76%, then the web-based learning media product as a geography learning medium is declared suitable and can be used in teaching and learning activities. If the assessment results obtained are less than 56%, then the development product needs to be revised so that the product becomes better and can be used in teaching and learning activities.

3. RESULTS AND DISCUSSION

Web Media Development Analysis

The development of web-based geography learning media for class 3) web media writing stage, and 4) web media assessment stage. This teaching material has advantages and disadvantages that still need improvement. The advantages of web-based geography learning media, compared to other web media, are as follows:

1. This web media is designed based on the characteristics of student users so that it can be used independently.
2. Web media is designed to support geography lessons with material on the distribution of flora and fauna. The discussions on the web are adapted to the 2015 curriculum.
3. This web media is equipped with the basis of the Al-Quran as well as content and instructions for using the media, so that readers can understand the purpose of the web media.
4. The material presented is in accordance with SK-KD so that this teaching material can be arranged systematically. Apart from that, it is also equipped with pictures and videos, which aim to develop students' knowledge about the distribution of flora and fauna in the world..
5. The completeness of this web media can also be seen through the quiz page, it is hoped that students can measure their abilities regarding what they have learned through this web media.

The disadvantage of the web-based geography learning media for students at Higher school, the web-based development that was developed was only limited to discussing one material, namely the distribution of flora and fauna in the world.

Expert Validation Data Analysis and Field Trials

1. Analysis of material expert validation data

Based on the scale conversion specified in the product assessment questionnaire, it is as follows:

- a. Score 1 for inappropriate, inappropriate, unclear, not interesting, not easy.
- b. Score 2 for less precise, less clear, less interesting, less easy.
- c. Score 3 for precise, appropriate, clear, interesting, easy.
- d. Score 4 for very precise, very appropriate, very clear, very interesting, very easy.

The following is a presentation of data from the validation of geography content experts on web-based geography learning media on the distribution of flora and fauna, as follows:

- a. Suitability of web-based learning media to achieve appropriate learning objectives.
- b. Suitability of material to appropriate learning objectives.
- c. The clarity of the content of the material presented is clear.
- d. The accuracy of the media with student characteristics is very precise.
- e. The attractiveness of the images on each display is interesting.
- f. The ease of understanding the material using web-based learning media is very easy.
- g. This web-based learning can increase students' motivation and interest in learning which is very motivating.
- h. The attractiveness of the learning design is interesting.
- i. Estimates of the level of learning effectiveness using web-based learning media models are very effective.
- j. The integrity of the material from beginning to end is very appropriate.

Data from the response questionnaire filled out by V1 as a material content expert, can be calculated using the percentage level of validity of teaching materials as follows:

$$\begin{aligned}
 P &= \frac{\sum x}{\sum xi} \times 100 \\
 &= \frac{37}{40} \times 100 \\
 &= 92,5\%
 \end{aligned}$$

Based on the results written above, a percentage of 92.5% is found to be in valid qualifications so that web media materials can be used with minor revisions. This information shows that the web media material on the distribution of flora and fauna in the world is suitable for use in accordance with expert validation of the content of the material.

2. Analysis of validation data from learning media experts

Based on the scale conversion specified in the product assessment questionnaire, as follows:

- a. Score 1 for inappropriate, inappropriate, unclear, not interesting, not easy.
- b. Score 2 for less precise, less clear, less interesting, less easy.
- c. Score 3 for precise, appropriate, clear, interesting, easy.
- d. Score 4 for very precise, very appropriate, very clear, very interesting, very easy.

The following is a presentation of data from material expert validation results as follows:

- a. Suitability of web-based learning design with the material presented.
- b. The flow or systematicity of the web-based learning media created. The images used really attract students' interest and are not appropriate.
- c. The accuracy of placing the menus in the display of the web-based learning media that is created is not precise.
- d. Accurate placement of supporting buttons in web-based media displays that are created precisely.
- e. Clarity of images (illustrations) used in web-based learning media are made clear.
- f. Clarity of text or writing in web-based learning media that is made clear.
- g. The appropriate use of video in web-based learning media is made precisely.
- h. The accuracy of using evaluation in the learning media created is less precise.
- i. The display design development technique (layout) is not appropriate.
- j. The attractiveness of visualization in web-based learning media that is made attractive.
- k. The color composition in the display (layout) is appropriate.
- l. The attractiveness of images (illustrations) in web-based learning media that are made attractive.
- m. The attractiveness of the display of subject matter content in web-based learning media that is made attractive.
- n. The attractiveness of the display of exercises or quizzes in web-based learning media is made less attractive.
- o. Easy to understand display design (layout).
- p. The ease of understanding the flow or systematics in web-based learning is made less easy.
- q. Ease of understanding the content of the subject matter in web-based learning made easy.
- r. The speed of displaying and accessing web-based learning media that is created is not suitable.
- s. Ease of navigation in web-based learning media made easy.
- t. Ease of presentation in web-based learning media made easy.

Data from the response questionnaire filled out by V2 as a learning media expert, can be calculated using the percentage level of validity of teaching materials as follows:

$$P = \frac{\sum x}{\sum xi} \times 100$$

$$\begin{aligned}
 &= \frac{53}{80} \times 100 \\
 &= 66,25\%
 \end{aligned}$$

Based on the results written above, a percentage of 66.25% was obtained which is quite valid with minor revisions. This information shows that web-based geography learning media, material on the distribution of flora and fauna in the world, is suitable for use in accordance with the validation of learning media experts.

3. Analysis of validation data from geography teacher learning experts

Based on the scale conversion specified in the product assessment questionnaire, as follows:

- a. Score 1 for inappropriate, inappropriate, ineffective, not interesting, not easy.
- b. Score 2 for less precise, less effective, less interesting, less easy.
- c. Score 3 for appropriate, appropriate, effective, interesting, easy.
- d. Score 4 for very appropriate, very appropriate, very effective, very interesting, very easy.

The following is a presentation of data from validation results from geography learning experts on web-based geography learning media regarding the distribution of flora and fauna in the world. based on table 4.3, is as follows:

- a. Suitability of the subject matter used with students' abilities.
- b. The accuracy of web-based geography learning media with the right student characteristics.
- c. attractiveness of the appearance and layout of attractive web media.
- d. The accuracy of web-based learning media for teaching precise geography
- e. The attractiveness of web-based geography learning media is interesting.
- f. The attractiveness of choosing colors on web media is very interesting.
- g. Students' interest in web media is created.
- h. Suitability of web-based geography learning media to achieve appropriate learning objectives.
- i. The level of student understanding of the material presented using web media is easy.
- j. The effectiveness of learning using effective web media.

Data from the response questionnaire filled out by X1 as a geography learning expert, can be calculated using the percentage level of validity of teaching materials as follows:

$$\begin{aligned}
 P &= \frac{\sum x}{\sum xi} \times 100 \\
 &= \frac{32}{40} \times 100 \\
 &= 80\%
 \end{aligned}$$

Based on the results written above, a percentage of 95% was found to be valid qualifications so that web-based geography learning media does not need to be revised. This information shows that web-based geography learning media with material on the distribution of flora and fauna in the world is suitable for use in accordance with the validation of teacher learning experts in the field of geography studies.

4. Analysis of media product trial validation data

The field trial assessments for each component are as follows:

- a. The attractiveness of presenting web-based geography learning media, from this statement, an assessment was obtained with a percentage of 79%.
- b. The ease of learning geography using web media, from this statement, a percentage of 77% was obtained.
- c. From this statement, the attractiveness of the images used in web media was obtained with a percentage rating of 81%.
- d. From this statement, the attractiveness of the design on web media was obtained with a percentage of 69%.
- e. The benefits of learning geography using web media, from this statement, was obtained with an assessment with a percentage of 81%.
- f. From this statement, the attractiveness of color in web media was obtained with a percentage rating of 67%.
- g. From this statement, the level of enjoyment of learning geography using web media was obtained with a percentage of 76%.
- h. With this web media there is more enthusiasm for learning geography, from this statement an assessment was obtained with a percentage of 86%.
- i. Able to understand geographic material studied using web media, from this statement an assessment was obtained with a percentage of 76%.
- j. Interest in various features available in web media, from this statement a percentage rating of 79% was obtained.

The response questionnaire filled in by 21 students Higher school students can be calculated as a whole using the media validity level percentage as follows:

$$\begin{aligned}
 P &= \frac{\sum x}{\sum xi} \times 100 \\
 &= \frac{647}{840} \times 100 \\
 &= 77,02\%
 \end{aligned}$$

Based on the results of the data calculations above, a percentage of 77.02% is obtained which is in valid qualifications so that teaching materials do not need to be revised. This information shows that the teaching materials are suitable for use in the learning process.

5. Data analysis of pre-test and post-test results

The results of the pre-test and post-test for class The mean post-test shows that there is a significant understanding of 31.43. At the same time, it is confirmed by the t-test analysis which shows that $t = 5.570$ is greater than $t \text{ table} = 2,086$. In conclusion, H_0 is rejected and H_a is accepted, so there is a significant difference between the results of understanding before and after using web-based geography learning media regarding the distribution of flora and fauna in the world. It can be said that web-based geography learning media is able to effectively increase understanding in geography lessons for students.

The develop and evaluate a web-based geography learning media using Moodle for the geography learning subjects of higher school, which may have different characteristics and needs from other students in other regions or countries. The research also contributes to the existing knowledge in the field of geography education and media education, by showing the positive influence of web-based geography learning media on the student learning outcomes and motivation [28]-[32].The research has some limitations, such as the small sample size of 21 students, the lack of a control group or a comparison group, and the short duration of the research, which only consists of two cycles. The research also does not measure the long-term effects of the web-based geography learning media on the student learning outcomes and attitudes. The research also does not consider the cultural and contextual factors that may influence the student learning interest and engagement in geography subjects

4. CONCLUSION

Web learning media has proven to be significantly effective in improving learning outcomes in geography subjects for students at Higher school. This is proven by SPSS 16.0 paired t-test calculations. In the significance test (2-tailed) it is written as 0.000. If ≤ 0.050 it means H_0 is rejected and is very significant. From manual calculations using correlated (related) tests, it was found that the results $thitung > ttabel$, namely $5,570 \geq 2,086$, meaning that H_0 was rejected and H_a was accepted, the conclusion was that there was a significant difference in the geography learning outcomes students at Higher school before and after using web media. The web-based learning media that has been developed received a good qualification assessment, because based on the validation results, a score from geography subject matter experts was obtained of 92.5%, which means that web-based learning media is feasible and does not need revision. From the media expert test, web learning media received a score. 66.2% and is in qualification

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