THE DEVELOPMENT OF WEB-BASED LEARNING MULTIMEDIA ON LITHOSPHERE MATERIAL AND ITS EFFECTIVITY IN IMPROVING STUDENTS' LEARNING MOTIVATION AND OUTCOMES

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Abstract

Science and Technology develop very fast in every aspect of life, including in the aspect of education. As the development of science and technology, guiding teachers to be able to make use various kinds of creative and innovative learning media in learning process at school is needed in order to increase the effectivity of the learning process which will have impact on the students'learning motivation and learning outcomes. According to the explanation, learning multimedia needs to be developed in order to increase the students' learning motivation and learning outcomes. The intention of this research is to develop a web-based learning multimedia on lithosphere material that is valid, practical and effective in improving students' learning motivation and outcomes. This research is a research and development (R&D) which refers to the development model of Hannafin and Peck, which is then modified by using Tessmer formative evaluation. The analysis results show that the web-based learning multimedia for lithosphere material has been proven its eligibility, that the web-based learning is valid, practical, to be used in learning process and is effective in increasing students learning motivation and learning outcomes.

Keywords: Development, Learning Multimedia, Website, Lithosphere.

1. Introduction

Internet technology is currently developing very fast and has been enjoyed by everyone, including in the aspect of education. Nowadays, almost every student already have a gadget that is capable of accessing the internet easily. It enables the students to be capable of acquiring various kinds of information quickly. In Indonesia, the government regulation on the use of Information and Communication Technology (ICT) is based on the President Regulation Number 50 of 2000 on the Indonesian Telematics Coordination Team that in order to anticipate the needs of society for the advancement of information technology and the use of telematics in order to support the improvement of national competitiveness,

therefore coordination and synergy in building telematics facilities, application and resources are needed in Indonesia.

UtilizationICT in the world of education, or often referred to as e-learning. Mohasin, Shinde and Khaparde (2013: 246) reveal that e-learning is a form of technology and innovation advancements in the world of education, in which the roles are increasingly become more important at the end of this decade, where the use of e-learning is able to change the traditional learning model into a more modern learning. Tsai (2009: 45) explains that e-learning has four characteristics of online learning environments, they are: more flexible time and space, indirect social interaction, abundant sources of information, and dynamic learning interface.

A research conducted in the Wilfrid Laurier University Canada (Umar, 2013; 15) reveal that students whose learning processes use web are proven to be able to learn faster compared to students whose learning process carried out in conventional manner, 80% of the students have good and very good achievement, while the other 66% of the students do not need printed learning source. The use of computer and web is adjusted to the level of needs in learning, it is done so that the use of computer and internet can be more optimal in helping the students to reach the purpose of learning expected in each learning subject, including in geography subject.

Daljoeni (2014: 1) explains that geography is the study of earth and its relationship to all of its contents such as human beings, animals and plants. Geography learning is divided into two aspects, which are physical geography which discusses about volcanism, earthquake, mining and types of rocks, and human-related geography. One of the geography learning materials in the curriculum of grade X high school is lithosphere. According to Hawley & Lyon (2017: 30) lithosphere is the outer layer of earth which has cooled down, it has various level of thickness and is relatively solid and strong. Lithosphere material is a part of physical geography in which the object of the study is material, therefore the learning materials are sourced from various kinds of physical materials that exist on earth.

A case that often happens in learning process is the less effective communication process that occurs between the teacher and students, therefore even though the information delivered is considered interesting and good, but if it is not communicated well then the students will have a hard time to understand and master the material delivered,it is caused by the lack of learning media used by teachers in presenting the learning material and presenting a geosphere phenomenon condition in learning process.In addition, the teachers also have

difficulties to deliver a lot of geography learning material with the limited time and space available. Good understanding and mastery of the learning material learned will determine the success of the students' learning purposes, which has impact on the increase of students' motivation and learning outcomes.

Day (2012: 308) explains that every individual has their own unique learning motivation. According to Huang (2012: 1755), learning motivation of students comes from the subjective experience they have, especially something that is related to their willingness to be involved in learning process and also their reasons to be involved. Su (2016: 2) explains that when students have high aspiration and motivation in learning, then the students can have good learning outcomes, by participating in the learning activities based on the intensity of their motivation, attitudes, and mental conditions. It is in accordance with the opinion of Moeed (2015: 25) who explains that when students are well-motivated in learning, then they will be fully involved in the learning, and if the students are not well-motivated then they will do the opposite.

Learning multimedia as a media (intermediary) becomes a bridge between the source and receiver of the information. Learning multimedia involves several media components to make the learning more interesting and easier to be understood by the students. Because in learning media, the materialpresentation is not only in form of text but it is the combination of several other media components such as pictures, video, audio, animation and others (Milovanovic, Perisic, Vukotic, Bugarcic, Radovanovic, &Ristic, 2016: 45). The utilization of multimedia in learning can also help to present an event that is beyond the direct reach of human, complex, complicated and dangerous that iswell-packed in a shorter/slower time. As explained by Gilakjani (2012: 62) that the advantages of using multimedia in learning process are not limited to the space-time which enables the students to learn by themselves anytime and anywhere.

2. The Methods

This research is conducted in SMAN 1 Prambanan, Sleman. This research is aResearch and Development (R&D) which refers to the development model of Hannafinand Peck (Wiyani, 2012: 44-46)in which consists of three phases, namely:

a. Analysis phase, in which in this phase the author analyzes the students' needs, identifies the students'behaviors and characteristics, identifies the objective, determines the objects on the learning media developed, and conducts evaluation and revision.

b. Design phase, in which in this phase the author designs the learning materials within the media developed, creates paper-based media, which is creating a design in a form of storyboard. Storyboard in a narration material used for the content and guiding materials that are then synthesized into things that want to be shown and said, the author then evaluates and conducts revision towards the flowchart and storyboard that have been made.

c. Development and implementation phase, in which in this phase the author creates a flowchart based on the storyboard that has been designed, and creates learning media based on flowchart that has been made. Within the implementation phase, the activities carried out are testing the learning media developed, then evaluating and revising the media that has been developed in order to be able to be used by the users.

The development trial design for the product is done by using Tessmer Formative Evaluation Model(1998: 15) which consists of 5 stages, namely self evaluation conducted by the author, expert review conducted by 3 expert, one-to-one evaluationconducted by 3 students, small group evaluation conducted by 9 students, and field test evaluation conducted by 26 students. Tessmer evaluation is used to assess the strength and weakness of the instruction in the development stage, with a reason to revise the instruction in order to increase its effectivity and attractiveness (Sahrir, Alias, Ismail, Osman, 2012: 110), and also to enable the design team to monitor the academic development of the students based on the learning purpose and the learning level determined by the design (Bowman, 2015: 51).

The instrument for collecting data in this research are questionnaire of learning motivation and learning outcomes measurement test. Students learning motivation indicators in this research refer to Keller's ARCS model (Robb, 2010: 33) with motivation indexes or markers such as attention, relevance, confidence, and satisfaction. The data analysis technique used is gain score, with the following criteria as in the following tabel 1.

Tabel 1. Gain Score (N-gain) Acquisition Category

Gain Score Criteria	Category
N-gain 0,7	High
0,7 >*N-gain* 0,3	Medium
N-gain < 0,3	Low

Source: Hake (1999: 2)

3. Result and Discussion

3.1 Validity And Practically of Web-Based Learning Multimedia for The Lithosphere Material

This development produces web-based learning multimedia on a valid and practical lithosphere material. The procedures in developing this media are done in three phases of analysis, design, and development and implementation in which the evaluation and revision are processed formatively by the developer and modified by using the Tessmer Formative Evaluation.

a. The Analysis phase consists of 6 (six) stages; (1) conducting discussion and interview; (2) identifying the students' needs, (3) identifying the students' characteristics; (4) identifying the purpose of web-based learning multimedia that will be developed; (5) determining and collecting the sources; and (6) conducting evaluation and revision toward the analysis that has been made.

b. The design phase consists of 3 (three) stages; (1) designing the material in web-based learning multimedia that will be developed; (2) creating paper-based, which is making a design in form of flowchart and storyboard as the material for narration and visual which consist of materials and related things that will be used as guidelines in developing the web-based learning multimedia; and (3) conducting evaluation and revision toward the analysis that has been made.

c. The development and implementation phase consists of 3 (three) stages; (1) developing web-based learning multimedia by using Adobe Flash CS6 based on the flowchart that has been made; (2) preparing domain and hosting that will be used for the web-based learning multimedia; and (3) conducting evaluation and revision toward the analysis that has been made.

The web-based learning multimedia produced from the production stage, which is named as the first prototype, is then evaluated by using the Tessmer model in order to produce a valid and practical web-based learning media, where the evaluation stage consists of expert review, one-to-one evaluation, small group evaluation and field test evaluation.

Expert review is wherethe material and instrument experts assess the media by filling a questionnaire, and providing comments and recommendations. The validation results of material expert are viewed based on three aspects; the learning eligibility and content, presentation eligibility, and language assessment which consist of 14 indicators and

descriptors. The validation results of media expert are viewed from four aspects; the graphics, coloring, interactivity and sounds which consist of 7 indicators and 20 descriptors. The validation results of instrument expert are viewed from three aspects; questionnaire format, contents, and language used that consist of 10 indicators. The validation results of expert review are presented in the following Table 2.

Table 2.The Validation Results of the Expert Review Stage

No.	Expert Review	Average Score	Criteria
1.	Material Expert	4,70	Very Good
2.	Media Expert	4,19	Good
3.	Instrument expert	4,53	Very Good

Source: Data processed in 2018

After the expert review, the next stage is the one-to-one evaluation trial which is conducted to three students, who have different academic abilities,where the students are asked to give their responds in form of comments and to fill in the assessment questionnaire. The results of the one-to-one evaluation trial are presented in the following Table 3.

Table 3.Assessment Distribution of One-To-One Evaluation

No.	Interval	Criteria	One-To-One Evaluation Trial	
			F	100%
1	5 > 4,22	Very Good	3	66,7%
2	4,21 – 3,41	Good	1	33,3%
3	3,40 > 2,61	Enough	-	-
4	2,60 – 1,79	Lacking	-	-
5	<1,79	Very Lacking	-	-
	Total		3	100%

Source: Data processed in 2018

The next stage is small group evaluation trial that is given to 9 (nine) students, who havedifferent academic abilities, where the students are asked to give their responds in form of comments and to fill in the assessment questionnaire. The following table presents the results of small group evaluation trial.

Table 4.Assessment Distribution of Small Group Evaluation Trial

No.	Interval	Criteria	Small Group Evaluation Trial	
			F	100%
1	5 > 4,22	Very Good	7	77,8%
2	4,21 – 3, 41	Good	2	22,2%
3	3,40 > 2,61	Enough	-	-
4	2,60 – 1,79	Lacking	-	-
5	<1,79	Very Lacking	-	-
	Total		9	100%

Source: Data processed in 2018

Next, the developer conducts revision to the third prototype of web-based learning multimedia and conducts trial on the field test evaluation that is given to 26 students in a class, who have various levels of abilities. As in the previous stage, the students are also asked to give their responds in form of comments and to fill in the assessment questionnaire. The distribution table of the field test evaluation can be seen as follow:

Table 5.Assessment Distribution of the Field Test Evaluation Trial

No.	Interval	Criteria	Field Test Evaluation Trial	
			F	100%
1	5 > 4,22	Very Good	20	76,9%
2	4,21 – 3, 41	Good	6	23,1%
3	3,40 > 2,61	Enough	-	-
4	2,60 – 1,79	Lacking	-	-
5	<1,79	Very Lacking	-	-
	Total		26	100%

Source: Data processed in 2018

Based on the assessment results of expert review, the one-to-one evaluation trial, small group evaluation and field test evaluation, it can be concluded that the web-based learning media for lithosphere material developed is valid and practical to be used in learning process.

3.2 The Effectivity of the Use of Web-Based Learning Multimedia forLithosphere Material

The effectivity of web-based learning multimedia for lithosphere material can be seen from the increase of students' motivation and learning outcomes based on the *n-gain* by comparing the pre-test and post-test scores. The graphic results for the students' average learning motivation before and after using the web-based learning multimedia on lithosphere material can be seen in the following picture.
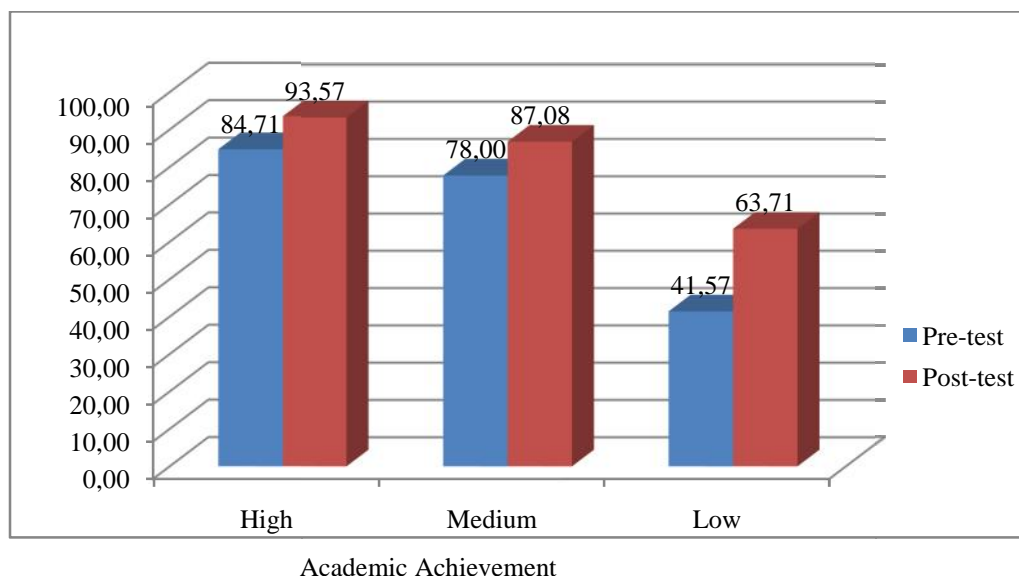
Picture 1.Graphic of the Students' Average Learning Motivation

Picture 1 shows that the students' learning motivation before and after using the web-based learning multimedia has experienced an increase, both in students who have the high, medium and low academic achievement. The comparison recapitulation of the students' learning motivation before and after using the web-based learning multimedia can be seen in the following Picture.
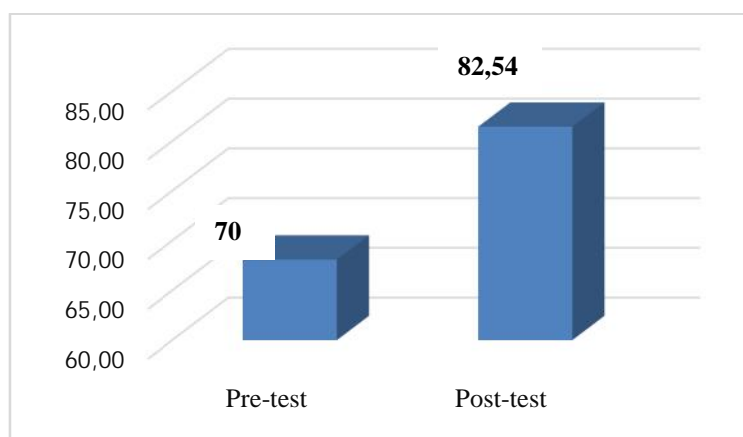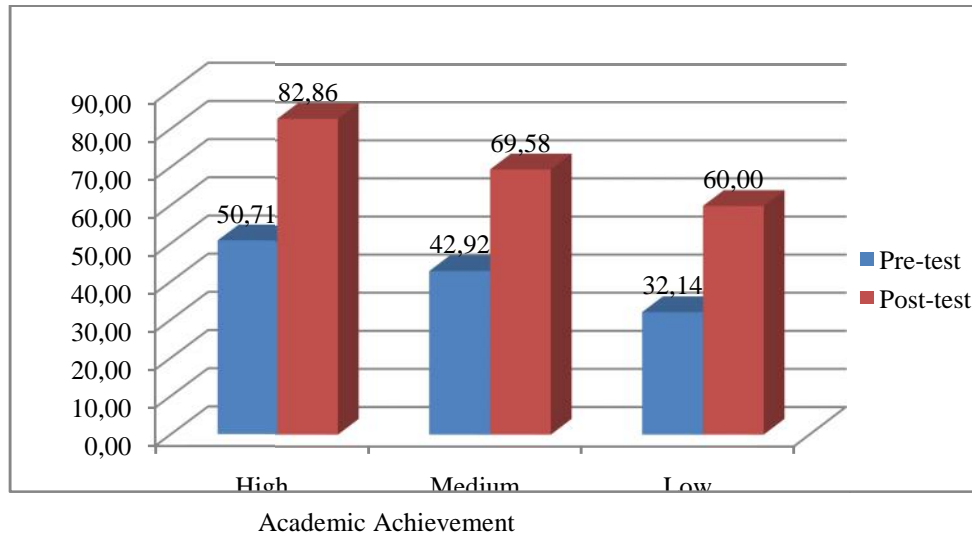

Picture 2.Comparison Recapitulation Graphic of the Students' average learning motivation

The average pre-test score of students' learning motivation before using the web-based learning multimedia is 70 and the average post-test score of students' learning motivation after using the web-based learning multimedia is 82.54. Based on the average score, the result analysis of *n-gain* can be acquired, in which it is 0.44 with medium effectivity category. The students' average learning outcomes in the pre-test and post-test
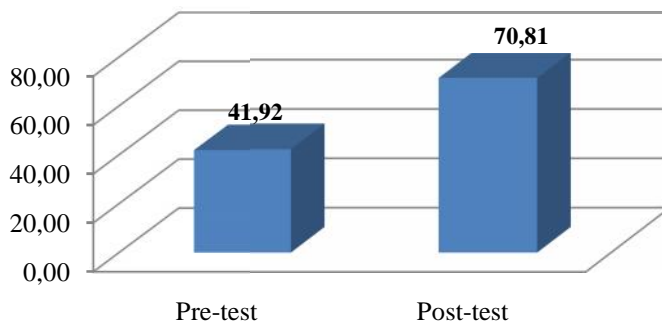
when using the web-based learning multimedia on lithosphere media can be seen in the following picture.

Picture 3.Graphic of the Students' Average Learning Outcomes

The picture 3 shows that the students' average learning outcomes before and after using the web-based learning multimedia has experienced an increase, both in students who have high, medium and low academic achievement. The comparison recapitulation of the students' average learning outcomes before and after using the web-based learning multimedia can be seen in the following picture.

Picture 4.The Comparison Recapitulation Graphic of the Students' Learning Outcomes

The average Pre-test score of the students before using the web-based learning multimedia is 41.92 and the average post-test score of the students after using the web-based learning multimedia is 70.81. Based on the average score, the result analysis of *n-gain* is acquired, in which it is 0.50 with medium effectivity category.

Learning multimedia is a combination of several media, combined as a message used to deliver a form of knowledge in order to stimulate students' choices, feeling, attention and interest in learning process. The use of multimedia in learning can help to deliver information in a more interesting manner and make it easier for the user to acquire the information. It is because the learning materials are not only delivered through words but through a simultaneous combination of video, picture, graphic and animation. In addition, the use of learning multimedia can also help in presenting an object which has a very small or big size more clearly and displaying the object in school, it can also display a dangerous event that is outside the reach of human directly in a faster/slower duration and to attract students' attention in order to emerge learning motivation that has influence in improving students' learning outcomes.

The results of this research show that the learning media developed is in valid, practical and effective category to be used in learning process, which is proven by the expert review conducted to measure the validity level of the multimedia, in which the average score is 4.47 with very good category, the practicality of the multimedia based on the assessment in the one-to-one evaluation stage is 66.67% with very good category, the small group evaluation is 77.8% with very good category and field test evaluation is 76.9% with very good category, and the effectivity in increasing students' learning motivation with *n-gain* of 0.50, in which it is in medium category. The results of this research is in accordance with the research conducted by Kusumaningtyas and Mukminan (2014: 14) that lithosphere material consists a lot of learning material and needs learning multimedia in the material presentation, in addition the results of this web-based learning multimedia development is proven to be effective in increasing students' learning outcomes, with the completeness of students' learning outcome percentage of 10%.

Permadi(2016: 13) in his research explains that web-based learning media development needs to be conducted so that the learning is not only carried out in conventional manner and becomes more interesting, so that the students can reach the passing grade in the competency taught. Cahyono (2013: 8) conducts a research in using web-based interactive media, in which the results of the research show that the students' learning motivation has experienced an increase of 17.65% and the students' learning outcomes also has experienced an increase of 44.12%.

Another research is also conducted by Fadli&Ikawati (2017: 7) , in which the results show that the use of learning multimedia has significant increase towards the learning

motivation, it is proven with their research which shows that the chi square (X^2) count acquired is bigger than the chi square (X^2) acquired in the table, which is $17.19 > 16.919$, therefore that the $H_0$is rejected and H_a is accepted, it means that the use of learning multimedia has significant influence towards students learning motivation. A research conducted by Sari &Suswanto (2017: 1008) explains that the use of web-based learning media in learning is effective in increasing students' learning outcomes, where there is an increase in the average score of pre-test to post-test, where the average pre-test score is 46.67 and the average post test score is 88.09.

4. Conclusion

The web-based geography learning multimedia for Grade X of high school students'lithosphere material developed is valid based on the assessment of expert review, in which the scores are 4.70 from the material expert, 4.19 from the media expert and 4.53 from the instrument expert. The result of the practicality test conducted in the one-to-one evaluation stage is 66.67% with very good category and the other 33.3% is in good category. The result of small group evaluation is 77.8% which is in very good category and the other 23.1% is in good category. The web-based learning multimedia for lithosphere material is proven to be effective in increasing students' learning motivation, with the average pre-test score of 70 and the average post-test score of 82.54 and the media is also capable of increasing the students learning outcomes with the average pre-test score of 41.92 and the average post-test score of 70.58.

Therefore in can be concluded, based on the resultsof research, that the development of web-based geography learning multimedia on lithosphere material for grade X of high school students has been proven its eligibility, that the web-based learning multimedia is valid and practical to be used in learning process and is effective in increasing students' learning motivation and learning outcomes.

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