Adobe Flash Application Development to Improve Mathematics Learning Outcomes For Class V

Lisa Dwi Sasmita, **Sutaryono**

Department of Primary School Teacher Education,
Faculty of Education, Universitas Negeri Semarang
Corresponding e-mail: lisadwisasmita98@gmail.com

Abstract

This study at developing instructional media, test the viability and effectiveness of adobe flash-based multimedia on cube and block nets for the fifth students at Candi Elementary School. The method used Research and Development (R&D). The results showed that adobe flash-based multimedia can be used in learning based on the content expert's assessment obtained a percentage of 74% and by media expert assessment obtained a percentage of 75%, both in viable category. The results of the adobe flash-based multimedia was effectively used in accordance with the results obtained with the value = 4.867 and = 2.045. From the calculation, obtained = 4.867> = 2.045, so, H0 was rejected and Ha was accepted. The results of N-gain data was 0.34 in moderate criteria..

Keywords: Adobe Flash, Learning Media; Mathematics; Multimedia

1. INTRODUCTION

The Law of the Republic of Indonesia concerning the National Education System Number 20 of 2003 states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character. , as well as the skills needed by himself, society, nation and state. The function of national education is to develop capabilities and shape the character and civilization of a dignified nation in the context of educating the nation's life, aiming at developing the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen. In Law no. 20 of 2003 concerning the National Education System Article 37 paragraph 1 which states that the primary and secondary education curriculum must include Mathematics subjects. The law confirms that Mathematics is a compulsory subject that is taught from the elementary level

Primary to secondary education. Mathematics is a subject that is expected to be useful in everyday life for students. In general, the learning process of Mathematics aims to make students able and skilled in using reasoning training in the application of Mathematics (Susanto, 2016: 189). In achieving the objectives of learning Mathematics, teachers can create conditions and learning situations that enable students to actively form, discover, and develop their knowledge. One of the best ways to learn is to use learning media.

Problems found inCandi Boyolali Elementary School, teachers do not use innovative learning media in the teaching and learning process. Teachers only use teaching materials in the form of teacher books and student books. The material contained in student books is not capable of improving students' understanding, such as in the Mathematics content the material for nets of cubes and blocks only contains making nets from paper, sample questions and practice questions so that learning is less interesting. From this phenomenon, the learning outcomes of fifth grade students at Candi Boyolali Elementary School are on average 38.3. It is also shown by data from 30 students, there are 25 students (83%) who get scores below the Minimum Completeness Criteria (KKM) which is 64, while the remaining 5 students (17%) scored above the KKM.

An alternative that can be done to improve student learning outcomes in Mathematics is to develop learning media. According to Suparman in Asyhar (2011: 4) media is a tool used to transmit information from the sender to the recipient. Meanwhile, according to Asyhar (2011:7) learning is anything that can bring information and knowledge in direct interaction between educators and students. From this explanation, the use of

learning media is very important to convey messages in the form of information to students.

Supported by Nur Hidayati's research in the Journal of Elementary Education (Vol. 3 No. 3 May 2017) from the Bachelorwiyata Tamansiswa University, entitled "Learning Effectiveness Using Interactive Multimedia (Adobe Flash cs6) Against Mathematics Learning Outcomes of Class V Students at SDN Jurug Sewon ". Based on the results of research and discussion, it can be concluded that learning using interactive multimedia is more effective than conventional learning on Distance and Speed material on the mathematics learning outcomes of fifth graders at SDN Jurug Sewon. This is evidenced by tcount more than ttable (tcount = 6.694 > ttable = 1.678) and the average test result of the experimental class (78.67) is higher than the mean of the control class (56.48). Other than that,

Rubhan Masykur, Nofrizal and Muhamad Syazali in the Journal of Mathematics Education (Volume 8 No. 2, 2017, Pages 177-186) from Raden Intan State Islamic University Lampung, entitled "Development of Mathematics Learning Media with Macromedia Flash". Based on the results of the validation of the development of mathematics learning media using the macromedia flash application program, an average score was obtained; (1) the feasibility of developing mathematics learning media using the macromedia flash application program validation results from material experts obtained an average of 3.73, in the linguistic aspect an average of 3.64 was obtained, in the aspect of the feasibility evaluation an average of 3.66 was obtained, the media expert obtained an average (media efficiency aspect obtained an average of 3.87, the key function aspect obtained an average of 3.5 and the Graphic aspect obtained an average score of 3.4).

Meanwhile, research by Santi Ratna Dewi and Haryanto Haryanto in the Journal of Basic Education and Learning (Vol 9(1), June 2018) from Yogyakarta State University, entitled "Development of Interactive Multimedia Addition of Integers for Grade IV Elementary School Students". Based on the research results, interactive multimedia addition to integers was developed through a series of evaluation stages to determine its feasibility. The feasibility test is carried out through evaluation by material experts, evaluation by media experts, and evaluation by students. The final results of the evaluation by material experts are included in the "Very Good" category with a mean score of 3.56. The final result of the evaluation by media experts was included in the "Good" category with a mean score of 3.28. The final result of the evaluation by students was included in the "Good" category with a mean score of 3.36.

The purpose of this research is to develop learning media that can improve learning outcomes in Mathematics subject for class V SD Negeri Candi Boyolali, test the feasibility and effectiveness of learning media based on adobe flash multimedia to improve student learning outcomes in Mathematics subject for class V SD Negeri Candi Boyolali.

2. RESEARCH METHODS

This research is a type of Research and Development (R&D) research. In this study apply a development model adapted from the development model according to Sugiyono according to the needs of researchers. The development procedures carried out by researchers are: (1) potential and problems; (2) data collection; (3) product design; (4) design validation; (5) revise the design; (6) testing the product; (7) revise the product; and (8) testing the usage. The following are the results of the research conducted.

The independent variable in this research is Adobe Flash Multimedia-Based Learning Media. The dependent variable in this study was the Learning Outcomes of Mathematics Lessons for Class V Elementary School Students of Candi Boyolali. The test technique in this study was in the form of pretest and posttest given to students. The no-test technique consists of observation, interviews, questionnaires, and documentation. Data analysis techniques used are product data analysis, initial data analysis, and final data analysis (t test, n-gain test).

3. RESEARCH RESULT AND DISCUSSION

Thus it can be concluded, audiovisual media is a learning media that involves the senses of sight and hearing simultaneously. The effectiveness of audiovisual media is also shown by the increase in learning outcomes obtained by experimental students which are higher than the control class. Based on the N-Gaiin test, the average criterion was obtained, namely (0.345) in the experimental class, while in the control class the criteria were low (0.289). The posttest score in the experimental class was higher than the posttest result in the control class. Therefore, SBdP learning applies the media model audiovisual in motive material batik Semarang.

Potential and Problems

Potentials and problems were carried out through observation, interviews and document data of fifth grade students of Candi Boyolali Elementary School. Based on the data

obtained, one of the identification results found by the researchers was the lack of use of learning media for mathematics content so that the learning process was less than optimal.

Data collection

The data collection stage is carried out to plan or design products in overcoming learning problems that are to be developed so that they are right on target and effective. Data collection is based on a questionnaire on the needs of teachers and students as well as a study of relevant research literature.

Product Design

The design of Adobe Flash multimedia-based learning media consists of several parts, namely cover, user guide menu, introduction menu, core competencies, basic competencies, indicators, material menus, quiz menus, info buttons, developer biodata, and bibliography.

Product Validation

The assessment of the feasibility of learning media based on Adobe Flash multimedia material for nets of cubes and blocks was assessed by 2 material experts and media experts. The results of the assessments of the two experts are presented in Table 1.

Table 1 Assessment of Media Eligibility

No	*Expert*	*Percentage*	*Criteria*
1.	*Media*	*75%*	*Worthy*
2.	*Material*	*74%*	*Worthy*

Based on table 1, it shows that the Adobe Flash multimedia-based learning media that the researchers developed had the results that media experts gave a score of 91% and material experts gave a score of 74%. Based on the results from media experts and material experts, it can be concluded that the feasibility of Adobe Flash-based multimedia learning media is in the worthy category to be tested at the usage test stage by making revisions according to suggestions from experts.

This is in line with the results of previous research conducted by Nur Hadiyan Rizkiyanto and Yoyok Yermiandhoko (2018) about "Development of Adobe Flash-Based CAI on Relationships between Lines and Angles in Grade IV Elementary Schools". The results of the feasibility test for material experts get a percentage of 75%, media experts 87%. This shows that the media is feasible and can be used as a learning medium. Research by Permana (2017) on "Development of Interactive Multimedia in Science Subjects Describing Animal Life Cycles in the Environment Around Grade IV Elementary School Students". The results showed that the percentage of material experts was 89.7% and media experts were 91.6%. It can be said that multimedia can be used in learning.

Design Revision

The design of learning media based on Adobe Flash is improved to improve its feasibility based on suggestions for improvement from media experts and material experts. Things that need to be fixed include improving the addition of more animations to the learning material.

Suggestions/ Comments	*Repair/Revision*
Added more animations to learning materials.	*Provide animation on learning materials.*
	

Product Trial

Adobe Flash-based learning multimedia product. Then it was tested on fifth grade students of SDN Candi Boyolali.

Student and Teacher Response Questionnaire

The student response questionnaire is a questionnaire given to students at the small-scale trial stage. The questionnaire filled out by 30 students showed very decent results for Adobe Flash-based multimedia learning. The student response questionnaire shows the percentage result of 90% with very feasible criteria.

The teacher response questionnaire is a questionnaire given to teachers to obtain information and input related to the feasibility of using Adobe Flash multimedia - based learning . The teacher's response questionnaire got a percentage of 91% and got very decent criteria. The use of learning media is considered by the teacher to be very helpful in learning.

Table 2 Questionnaire Results of Teacher and Student Responses

Response	*Classical Percentage*	*Criteria*
Teacher	*94%*	*Very Worthy*
Student	*89%*	*Very Worthy*

Similar research is research by Frista Meylinda, Setya Yuwana, and Wahyu Sukartiningsih in the Journal of Educational Studies and Research Results (Vol 2, No. 3, September 2016) from the State University of Surabaya, entitled “Development of Learning Media for Speaking Skills with Adobe Flash Program for Class V Elementary School Students”. From the results of the validator's assessment, an

average percentage of 92.4% was obtained, with very decent criteria. The results of the teacher's activities during the learning process by using the media in a limited trial and in a broad trial obtained a percentage of 90.5% and 95.8% with a very active category.

Research by Fitri Yuliawanti in the Journal of Elementary Education of UIN Sunan Kalijaga Yogyakarta (Volume 3 Number 3 May 2017) entitled "Development of Adobe Flash CS3 Professional-Based Learning Media in Science Learning Based on Islamic-Science Integration in Elementary/MI Grade 5" . Based on the assessment of the material expert is Very Good (SB) with an average score of 65 and based on the assessment of the media expert is Good (B) with a score of 55, the professional adobe flash cs3-based learning media in science learning based on Islamic-science integration in SD/MI class 5 suitable for use as a learning medium.

The Effectiveness of Adobe Flash Multimedia-Based Learning Media

The effectiveness of learning development based on Adobe Flash multimedia was analyzed through t-test and n-gain test. The t-test and n-gain test were carried out after carrying out the normality test first. The normality test of learning outcomes data before and after learning is calculated using the chi square test formula assisted with the help of Ms software. Excel. The effectiveness of learning development based on Adobe Flash multimedia can be seen from student learning outcomes which consist of scores before and after learning. Scores before and after learning can be seen in table 3.

Table 3 Score Results Before and After Learning

Action	*The number of students*	*Average*	*tcount*	*table*	*description*
Before	*26*	*69.23*	*4, 876*	*2.045*	*Ho rejected*
After	*28*	*82.62*			

Based on the table, obtained the value of t_{hitung} = 4,876 and = 2,045. From the calculation results obtained = 4.876 > = 2.045 then$t_{tabel}t_{hitung}t_{tabel}$H0 is rejected and Ha is acceptedor it means that the learning media based on Adobe Flash is effective for improving mathematics learning outcomes for class IV material on cubes and blocks.

Research by Andino Maseleno, et al in the Jour of Adv Research in Dynamical & Control Systems (Vol. 10, 14-Special Issue, 2018), entitled "Developing Multimedia Application Model for basic Mathematics Learning". From the results of this study it can be concluded that elementary school students feel interested thereby increasing their desire to learn. Using interactive learning methods can make it easier for teachers to deliver material. In terms of education, technological developments are needed in learning methods because they can make all material delivery easier. In terms of information, technological developments are needed to help each other in carrying out their duties.

Research by Farid Ahmadi, Sutaryono; Yuli Witanto, and Ika Ratnaningrum in the Journal of Educational Research (Vol. 34 Number 2 of 2017) from the State University of Semarang, entitled "Development of Educational Media "Multimedia Indonesian Culture (MIC) as Strengthening Elementary School Character Education". Based on the test results of the fourth grade students of Al Madina Islamic Elementary School, Semarang City, it showed a completeness score of 100% and achieved an increase of up to 33.21 from the pre test and post test in learning with MIC learning media as an effort to strengthen character education in elementary schools.

The next step is to calculate the n-gain test. From the data processing, the results are shown in table 4.

Table 4 N-Gain . Test Results

No	*Information*	*Learning outcomes*	
		Pre-Test	*Final Test*
1	*The number of students*	*30*	*30*
2	*Completeness*	*40%*	*70%*
3	*The highest score*	*90*	*93*
4	*Lowest value*	*43*	*68*
5	*The number of students finished*	*8*	*21*
6	*Average*	*72*	*81*
Increase (N-gain)			*0.34*

Based on Table 4, the results of the n-gain test show that the average increase in learning outcomes from scores before and after learning has an n-gain test score of 0.34 with moderate criteria. This shows that the development of learning based on Adobe Flash is effective for improving students' writing skills.

4. CONCLUSION

Based on the results of the analysis of the assessment questionnaires given to media experts and material experts, an effective Adobe Flash multimedia-based learning book is very suitable to be used as a learning medium. The percentage of eligibility given by media experts is 75% and material experts is 74%.

Adobe Flash-based learning received positive responses from teachers and students, and is effectively used in learning. This is indicated by the increase in scores obtained by students on the cube and block material. The average score before learning using effective Adobe Flash multimedia-based learning is 72 and the average score after learning using effective Adobe Flash-based learning is 81. Adobe Flash-based learning is effectively used in mathematics subjects seen from the t-test results.obtained = 4.876 > = 2.045$t_{hitung} t_{tabel}$). It was concluded that the results before and after learning experienced significant changes. Furthermore, the n-gain test calculation data is 0.34 seen from the difference in results before and after learning.

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