Developing Scientific-Based Interactive Multimedia of Learning on 4th Grade Students of Elementary School

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Abstract - **The aim of this research was to create interactive multimedia of learning based on Scientific on *indahnya keragaman di negeriku* theme. This research is Research and Development (R&D). The development model was consisted of defining, designing, developing, and disseminate. The subject of this research was the 4th grade students of 104258 Private Elementary School in Pematang Biara which consisted of 32 students and the object was the interactive multimedia product. The research result was obtained that the development interactive multimedia by material expert with score average 3,85 in valid category. Whereas, the score average of media expert 3,52 and the graphic design expert 3,45 in valid category. The result of interactive multimedia effectiveness was obtained in the first PKK trial was 84,37% (27 students) and 15,62% (5 students) has not passed while the second trial was obtained PKK 93,75% (30 students) and 2 students (6,25%) has not passed. The practically of learning media was obtained teacher's response in first trial was 89,28% and second trial 69,42% in practical category. N-Gain was obtained in the first trial 0,5 (medium) and second trial 0,7 % (very high).**

Key Words : Learning media, interactive multimedia, scientific

I. INTRODUCTION

Education is a process of someone personality development which is done consciously and full of responsibility. To improve the knowledge, skills, attitudes and values so that able to adjust with the environment. In improving the national education quality, the government has done various efforts to create the education purpose with improving the education system defiance in 2013 curriculum. One of the aspects that support the 2013 curriculum is the learning media. A medium (plural media) is a channel of communication, example include film, television, diagram, printed materials, computers, and instructors" [1]. Media is the communication channels such as film, television, diagram, printed material, computer and instructor). In learning process of 2013 curriculum use

scientific approach. The learning media and learning approach is needed to support the learning process. The scientific approach is learning approach which done by observing, questioning, experimenting, associating, and communication [2]. The scientific approach in the learning process is the characteristic of 2013 curriculum. The use of learning media is expected to help the effectiveness of the learning process or the delivery of messages to students in order to become good citizens. The media is classified into seven groups, namely objects to be demonstrated, oral communication, print media, still images, moving images, sound films, and learning machines [3]. A good learning media must fulfill several conditions, namely learning media must be able to increase the motivation and effectiveness of students in learning. Based on the results of field observations conducted at SDN 104258

Pematang Biara, it is acknowledged that there were still many problems faced by schools, teachers and students in teaching and learning activities (KBM), where teachers only used learning media available in schools made of cardboard, pictures and power points, so learning feels monotonous which makes students feel bored. To improve the learning process, the school has also provided facilities and infrastructure related to laptops / computers, projector to support the success of student learning but the problem is the teacher does not have the skills in developing interactive multimedia learning media which consequently the media used by the teacher has not been maximized in the learning process take place. The private elementary school of 104258 in Pematang Biara has implemented the 2013 curriculum in the learning process. Some teachers still have not been able to apply learning with the 2013 curriculum which is a reference for the learning process in elementary school. The teacher still use a conventional approach whereas in the implementation of the 2013 curriculum the teacher must apply the scientific approach. This is a problem for teachers in carrying out learning to activate students. Therefore, it need a tool to support the learning process so that learning becomes effective, interesting and fun. One of the supports of learning is learning media, especially scientific-based interactive multimedia. It is appropriate that the use of interactive multimedia can help students understand the material taught through an attractive, easily understood, and enjoyable presentation pattern [4]. Interactive multimedia is a tool or means of learning that contains material, methods, boundaries, and ways to evaluate that were designed systematically and interestingly to achieve the competencies / sub competencies of subjects that are expected in accordance with the level of complexity [5]. Learning through multimedia is a learning that is designed using various media simultaneously such as text, images (photos), animations, videos (films), etc all of which are together to achieve the learning objectives formulated previously [6]. Interactive multimedia has a positive strength in synergy that is able to change attitudes and behavior towards creative and dynamic change. The role of interactive multimedia is needed in learning where it developed. The presence of computers is part of the development of technology with various programs and applications that have provided tremendous benefits. The program that is able to package various media into multimedia learning with computer aids Adobe Flash CS6. Interactive multimedia is designed by involving the characteristics of students that are adapted to the environment and the availability of facilities and infrastructure in the school. Therefore, interactive multimedia is expected to be suitable and effective with the needs of students and facilitate teachers in the implementation of learning. The material chosen in the development of interactive multimedia is the material contained in the second semester of the 7th theme *indahnya keragaman di negeriku* and the subtheme *keragaman suku bangsa dan agama dinegeriku*. With the existence of interactive multimedia is expected to be able to help the difficulties and needs of teachers in the procurement of learning media. So that the learning objectives in the 2013 curriculum are achieved.

II. RESEARCH METHODS

A. Types of research

This research is a type of development research (Research & Development). The development model, namely the 4-D model which consists of 4 stages, namely: (1) defining, (2) designing, (3) developing (4) disseminating.

B. Location and Time of Research

This research has been carried out at SDN 104258 Pematang Biara, Pantai Labu Sub district, in the even semester of 2017/2018 academic year.

C. Development Procedure

The procedure for developing learning devices in this study refers to the device development model, namely the 4-D models which consists of 4 stages, namely: (1) the defining stage is to decide and define the requirements in the development of learning that is tailored to the needs in the field of research location. The phases in this stage are initial RTP: Average total score

A_j: Scoring score for each 4 indicator

n_j: Number of 4 indicator

analysis, student analysis, task analysis, concept analysis, and formulation of learning objectives. (2) At designing stage, the initial drafting was carried out to design a prototype learning media consisting of 4 steps: test preparation, media selection, format selection and initial design. (3) Developing stages aims to produce a good final learning media. This stage begins with a validation process by experts, followed by field trials. (4) At disseminate stage, the final draft is packaged and distributed as learning media that have fulfilled valid, practical and effective indicators [7].

D. Technique of Analyzing Data

Media validation questionnaire data developed will be analyzed and assessed by experts. The formula used to calculate the expert validation is:

$$RTP = \frac{\sum_{j=1}^{n} A_j}{n_j}$$

TABLE 1 Classification of Learning Media Validation

Achievement level	Validation classification
$3 \leq RTP \leq 4$	Valid (feasible)
$2 \leq RTP \leq 3$	Sufficiently Valid (feasible enough)
$1 \leq RTP \leq 2$	Invalid (Not feasible)

(source: Damayanti: 2015)

The effectiveness level of Adobe Flash learning media used during the learning process is determined by several categories:

$$\langle N - g \rangle = \frac{\langle gain \rangle}{\langle gain \rangle_{max}} = \frac{\langle post\ tes \rangle - \langle pre\ tes \rangle}{100 - \langle pre\ tes \rangle}$$

Hake (1

TABLE 2 Criteria for Effectiveness

Score Achievement Criteria	Effectiveness level
n-gain $\geq 0,7$	High effectiveness
$0,3 <$ n-gain $< 0,7$	Medium effectiveness
n-gain $\leq 0,3$	Low effectiveness

(source: Hake, 1999)

III.   RESULTS AND DISCUSSION

TABLE 3 Results of Learning Media Validation

No	Validated	Average	Number	Total Average	Classifications
1	Media Experts	3,52			
2	Material Experts	3,85	10,79	3,60	Valid (Feasible)
3	Graphic Design Experts	3,45			

Based on the diagram above, the average score obtained by the media expert validator on the learning media is 3.52. The average score given by the material expert validator is 3.82. The average score given by the learning media graphic design expert is 3.45. From the

total number 10.79 with an average score of learning media that is validated by the three validators of 3.60 categories is very valid (very feasible) and can be used.

To see the increasing of percentage in the results of the teacher's response in trial I and trial II can be seen in the following diagram:
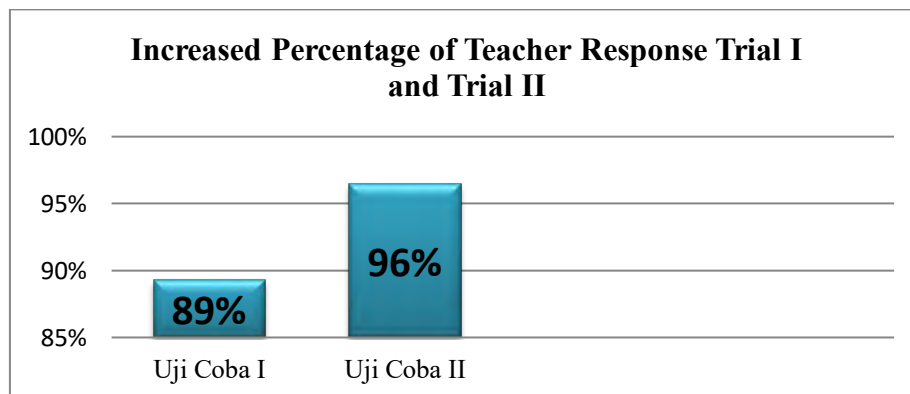

Fig 4.1 Increasing Percentage of Teacher Response Trial I and II

Based on the picture above can be seen an increase in the percentage of student responses in trial I and trial II. Whereas in the first trial I obtained 89% while in the second trial 96%.

At the trial stage there are learning outcomes given to students consisting of pretest and post test.

TABLE 4.3 Level of Pretest Classification

No	Range of numbers	Letter	Frequency	Percentage
1	3.85-4.00	A	0	0
2	3.51-3.84	A-	0	0
3	3.18-3.50	B+	6	18.75%
4	2.85-3.17	B	6	18.75%
5	2.51-2.84	B-	7	21.87%
6	2.18-2.50	C+	6	18.75%
7	1.85-2.17	C	5	15.63%
8	1.51-1.84	C-	2	6.25%
9	1.81-1.50	D+	0	0
20	1.00-1.17	D	0	0
	Total		32	100%

Based on the table of the pretest results analysis before using the developed media obtained the PKK value of 37.5% which was declared incomplete.

Table 4.4 Completeness Data of Trial Learning Outcomes I

No	Range of Numbers	Letter	Frequency	Total	Percentage	Criteria
1	3.85-4.00	A	2			
2	3.51-3.84	A-	3			
3	3.18-3.50	B+	15	27	84,37%	Complete
4	2.85-3.17	B	6			
5	2.51-2.84	B-	4			
6	2.18-2.50	C+	2			
7	1.85-2.17	C	0	6	16%	Uncompleted
8	1.51-1.84	C-	0			
9	1.81-1.50	D+	0			
20	1.00-1.17	D	0			
	Total		32			

Based on the table, it can be obtained that the percentage of classical completeness (PKK) in posttest student learning outcomes using interactive multimedia of learning media is 84.37%. This suggests that the fourth grade students of SDN 104258 Pematang Biara have filled the percentage of classical completeness. From the results of pretest and posttest can be obtained N-gain of 0.5 which is classified in the medium category.

TABLE 4.5 The Classification of Student Learning Outcomes Trial II

No	Range of Numbers	Letter	Frequency	Percentage	Total	Percentage	Criteria
1	3.85-4.00	A	7	21,875	30	93.75%	Complete
2	3.51-3.84	A-	10	31,25			
3	3.18-3.50	B+	9	28,125			
4	2.85-3.17	B	4	12,5			
5	2.51-2.84	B-	2	6,25	2	6.25%	Uncompleted
6	2.18-2.50	C+	0				
7	1.85-2.17	C	0				
8	1.51-1.84	C-	0				
9	1.81-1.50	D+	0				
20	1.00-1.17	D	0				
Total			32				

Based on the table above can be seen the level of classification of student learning outcomes increased from before. At the level of classification student learning outcomes in trial II obtained 30 students (93.75%) completed while 2 students (6.25%) have not been completed.

From the effectiveness data results obtained from the pretest, posttest and N-Gain scores, it can be seen that the average scores obtained were pretest 9.75, posttest 13.25 and Gain score 0.7 which were categorized as high. Then it can be stated from the results of trials I and II that the interactive multimedia learning media developed have been very suitable to use in the learning process and can improve student learning outcomes on the *indahnya keragaman di negeriku* theme and *keragaman suku bangsa dan agama dinegeriku* the sub-themes.

IV. CONCLUSION

The developing Scientific-based interactive multimedia using Adobe Flash on the *indahnya keragaman di negeriku* theme and *keragaman suku bangsa dan agama dinegeriku* show that learning media is valid, practical and effective. The results showed that interactive multimedia was developed according to material experts with an average value of 3.85 in valid categories. Whereas media experts averaged 3.52 and graphic design experts averaged 3.45 in valid categories. The results of the interactive multimedia effectiveness developed were obtained in the first trial PKK at 84.37% (27 students) and 15.62% (5 students) have not been completed while in the second trial PKK was obtained at 93.75% (30 students) and 2 students (6.25%) have not been completed. The practicality of learning media obtained by the teacher response trial I was 89.28% and trial II 96.42% in the practical category. N-Gain was obtained in trial I 0.5 (medium) and trial II 0.7 (very high).

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