

Digital Learning Media of Surakarta Hadiningrat Sultanate Museum

Endah Sudarmilah¹, Mutiara Layang Fatimah², Tri Sagirani³

¹*Informatics Department, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia.*

²*Informatics Engineering Education Department, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia.*

³*Universitas Dinamika, Surabaya, Indonesia.*

Abstract

In Indonesia, there is a lot of cultural wealth and potential to be developed. One of the efforts to preserve and develop cultural heritage is presenting it in the Sultanate of Surakarta Hadiningrat Palace Museum, therefore it can be known to the public. This study employed Construct 2 application to develop instructional media in SD Negeri Kleco 1 Surakarta and thus it can determine the difference between student learning outcomes using conventional methods (lectures) and the use of media. The method used was Research and Development. The development model was ADDIE (Analysis - Design - Development - Implementation - Evaluation). Data collection techniques in this research were observation, questionnaire and student test by giving pre- and post-test questions to two classes namely class control (lecture method) and class experiment (learning media). Data analysis techniques were by calculating the percentage of the feasibility test from the results of the questionnaire, usability and hypothesis testing. The results of this research were as follows: The average result of media experts is 83.78% in which it is categorized as very feasible; likewise, the average of material experts is 94.84%; the average of student response is 78.75% in which it is categorized as Acceptable. The conclusion is that historical learning media is appropriate to be used in the historical lessons of Indonesian civilization. This research has produced learning media for grade V elementary schools that have tested the usability system usability scale (SUS) with an average SUS score of 78.75% which is classified as good quality applications.

Keywords: Construct 2, Learning Media, History, system usability scale.

I. INTRODUCTION

Museum is considered as a historical heritage and it can provide some information in education field. Education makes history as one of materials that must be mastered by students; however, the learning method in history can be said as boring since the introduction for students is usually only some images or texts. Therefore, the development of increasingly sophisticated multimedia technology has much benefit for human life as well as to education field. One of them is learning media that is creative media employed in delivering lesson material for students and thus learning process can become more effective, efficient, and enjoyable [1].

Surakarta Hadiningrat Sultanate museum is one of the museums thick in Javanese culture. It keeps and preserves a lot of Javanese historical and cultural objects [2]. In digital learning media, there is sometimes lack of interaction between teacher and students themselves. Not all places are facilitated with internet and thus it can be inserted an offline game that can motivate students to study harder.

This study is to develop Digital Learning Media of Surakarta Sultanate Museum. This media contains material, video, and several exercises. The latter is intended to find out students' ability in learning-teaching by obtaining the best mark or score. As with this Digital Learning Media, it is expected to improve the capacity in learning process.

II. METHOD

Research and Development (R&D) is "a bridge" between basic research and applied research. Basic research aims to discover new knowledge about fundamental phenomena, while the latter aims to find knowledge being practically applicable, though applied research is also sometimes used to develop a product [3]. Development model employed ADDIE method containing several stages that can be used to design and develop effective and efficient training. Some activity stages available in ADDIE are Analysis, Design, Development, Implementation, and Evaluation [4].

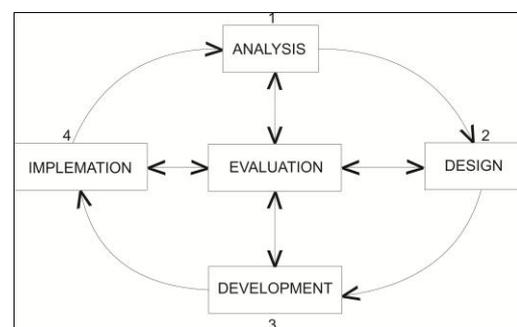


Figure 1. ADDIE Model

Analysis is the first stage to find out the students' necessities. One of them is the need of interesting learning media for them to be more focus and also the desire to improve learning process. As the students receive the learning they like and enjoyable in the teaching and learning process, then they will

be easier to understand the subject delivered. Therefore, it is expected to have the better outcomes than before.

Design of decent learning media and needed by fifth graders of SD Negeri Kleco 1 Surakarta is about the general knowledge in which it is less desirable by students. This knowledge is the history of Surakarta Hadiningrat Sultanate. This media learning was designed based on analysis, namely the interview result with the history teacher. Design of the media is presented in Figure 2 as use case.

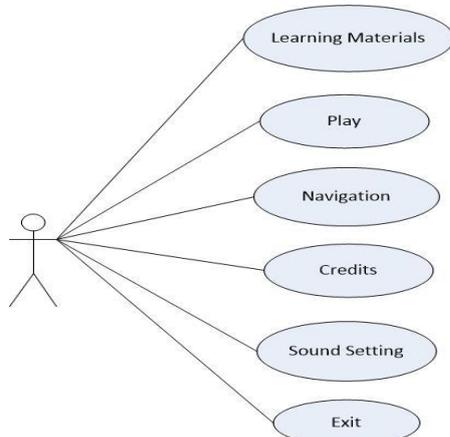


Figure 2. Usecase Diagram

Development, for this stage, the researchers developed a learning media in accordance to the previous design. In this media, there was a material of sultanate history, introduces sultanate genealogy, video, learning, and exercises practicing as the evaluation in the learning media. It was constructed by applying Construct 2 having 2D basis. The results can be seen at Figure 3.

Implementation, Digital learning media was created by the researchers for fifth grader in SD Negeri Kleco 1 Surakarta. This was divided into two groups: control class (conventional method) and experiment class (applying learning media).

Evaluation, evaluating every product development already run in stages and thus it can improve the deficiencies through some solution already given by media expert, material expert and fifth grader of SD Negeri Kleco 1 Surakarta. From the testing performed by three of them, it can be obtained assessment that becomes an assessment evaluation material as questionnaire and input. This evaluation stage is, in addition to questionnaire, suggestion or input provided, outcomes from comparison between conventional method (lecture) application in control class and learning method application using learning media in experiment class.

Data collection technique and instrument employed in this study was questionnaire and then comparing student learning outcome through pre- and post-test exercise result by providing learning in control class (lecture method) and experiment class (applying learning media). While to find out student learning outcome, it was used normality test, homogeneity test, paired t test, independent t test, n-gain test, and independent n-gain test. Feasibility test analyzed by Equation 1 used feasibility percentage.

$$\text{Percentage of Feasibility} = \frac{\text{current score}}{\text{maximal score}} \times 100\% \quad (\text{Eq. 1})$$



Figure 3. Learning Media Scene

III. RESULTS AND DISCUSSION

A. Animation Creation Stage

1) Pre-Production Stage

a) Wireframe

Wireframe is a preliminary design in learning media construction. Its function is to illustrate the route and picture layout as well as function that will be performed in the media.

b) Designed Asset

Design developed in the learning media is Construct 2 and Corel Draw. Design should be adjusted with wireframe previously created.

2) Production Stage

a) Learning Media

The researchers performed learning media development process that was changing wireframe into digital form by applying Construct 2.

b) Dubbing and Music

Dubbing is performed to clarify text and image, and sound or music choice as suitable to media and it will support the media to be better.

B. Testing and Implementation

Observation data regarding learning process in this study was the one obtained based on teacher observation result in SDN Kleco 1 Surakarta for the fifth grade (V). The control class applied conventional method in passing on the material, while experiment class used learning media.

Figure 4 showed that the assessment between three respondents can be stated as similar. First respondent presented efficiency aspect of 81.25%; display, quality, and software aspect showed similar result of 75%. Second respondent showed efficiency of 100%, display aspect 77.5%, technical quality aspect 83.33%, and software aspect 75%. Third respondent demonstrated efficiency aspect result of 100%, display aspect 92.5%, technical quality aspect 83.33%, and software aspect 87.5%.

The average of three respondents were having 93.75% efficiency aspect, 81.66% display aspect, 80.56% technical quality and program effectiveness aspect, and 79.16% for software aspect. Therefore, four aspects being assessed to three respondents mostly provided the very decent value.

Figure 5 showed the assessment between three respondents, and the result can be stated as almost similar. The first respondent showed the result of 100% for learning aspect and 92.85% for display aspect. The second respondent demonstrated the result of 91.66% for learning process and 100% for content aspect. Third respondent showed the result of 91.66% for learning process and 92.85% for content aspect.

Mean for three respondents in learning aspect was 94.44% and content aspect was 95.32%. Therefore, three respondents assessed all four aspects as having a very decent score.

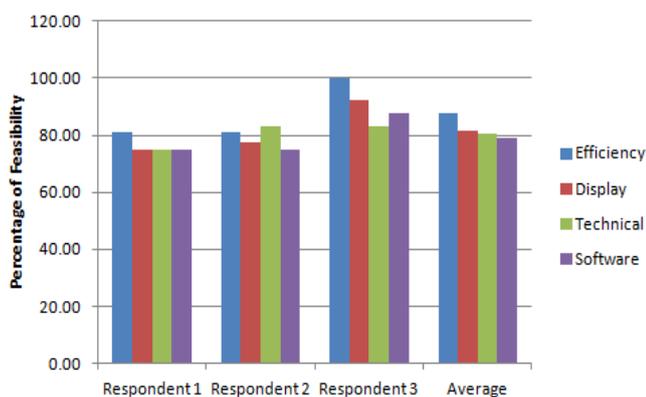


Figure 4. Media Expert Feasibility Test Result

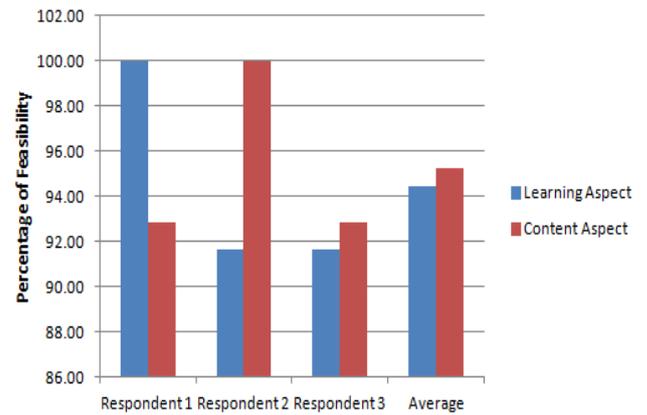


Figure 5. Material Expert Feasibility Test Result

Table 1. SUS Testing Result

Respondents Name	Questions' items										Total	SUS Score (Total * 2.5)
	1	2	3	4	5	6	7	8	9	10		
Adi Putra Harun	4	4	1	0	0	2	1	2	4	4	22	55
Ajimas Apta Negara	2	4	4	4	4	4	4	4	4	1	35	87,5
Alfath Orlando Bagastama	4	4	4	4	3	4	4	4	4	4	39	97,5
Almira Eliansha	3	3	2	3	4	3	4	3	3	4	32	80
Athala Rafa Pratomo	4	3	4	4	4	4	2	4	4	4	37	92,5
Dony Agung Fitriyadi	4	4	4	4	4	3	4	4	4	2	37	92,5
Failawati Nur Rizkie	4	4	4	4	4	3	4	3	4	3	37	92,5
Farrel Aurelio Kurniawati	4	4	4	4	3	3	3	4	4	4	37	92,5
Ganendra Evender Dimitri	4	1	2	0	1	2	4	2	4	2	22	55
Gistafrea Putri Hatmoko	4	4	3	0	4	4	4	4	3	1	31	77,5
Kayra Ivana Winata	3	3	3	1	4	3	3	3	4	0	27	67,5
Kaysya Ivana Airin	4	4	3	3	3	3	4	4	4	1	33	82,5
Kaysheela Rajwa Humaira	3	4	4	0	3	4	4	4	0	0	26	65
Keysha Marika Dewi	4	1	4	1	4	2	4	2	3	4	29	72,5
Kirana Ni'ma Fayza	3	4	4	1	4	3	3	3	3	1	29	72,5
Lanang Tirta Cakra Wangsa	3	4	3	4	3	3	3	4	3	3	33	82,5
Margharetha Angel Haryadi	4	4	4	2	4	2	4	4	4	2	34	85
Maryam Khoirunnisa	3	3	3	3	3	3	1	3	2	1	25	62,5
M.Dru Almer Putra	4	4	4	4	4	2	4	2	4	3	35	87,5
M. Ivander Aliano	4	3	3	3	4	3	3	3	3	3	32	80
M. Rasya Taqwa	3	2	3	0	3	4	4	3	3	1	26	65
Nadia Sri Raihanah	4	1	4	1	4	2	3	0	4	0	23	57,5
Nirbita Gayuh Pinastika	4	4	4	2	4	2	4	3	4	3	34	85
Putri Amorita Azza Fidela	3	3	4	1	4	4	4	3	4	1	31	77,5
Rafael Praditya	3	4	2	4	4	4	2	4	4	1	32	80
Shora Nizzata Al Hayy	3	3	4	2	3	3	4	3	3	2	30	75
Syakira Aufa Pagi Fadhillah	3	4	4	4	4	1	3	0	4	0	27	67,5
Wahyu Hastra Utama	4	2	3	3	4	4	4	4	4	3	35	87,5
Yeremia Erwin Kristyawan	4	4	4	4	4	4	4	4	1	4	37	92,5
Zaidan Hisyam Albatati	4	4	4	4	3	4	3	4	4	4	38	95
TOTAL												2362,5

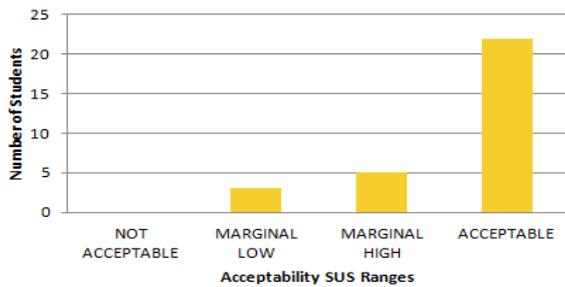


Figure 6. SUS Score Result

Based on Table 1 and Figure 6, students' questionnaire calculation provided mean score of 78.75, and thus this result is above average. Researchers used SUS score assessment with Acceptability Ranges showing 0 or null for not acceptable, 3 students for marginal low, 5 people for marginal high, and 27 people for acceptable. It can therefore be said that the media is classified as Acceptable having average range of 71-100. This showed that learning media application can be well accepted by user or students in terms of usability aspect.

Table 2. Homogeneity Test Result

Student Learning Outcomes	Levene	Sig.
Based on Mean	0.140	.079
Based on Median	0,077	.782
adjusted df 0,552	0,077	.782
trimmed mean	0,140	.709

Table 2 displayed the result of homogeneous (similar) and heterogeneous (not similar) testing. It also presented Significance (Sig) result. Based on average 0.709 meaning that > 0.05 , thus it can be concluded that post-test data of both control and experiment class is similar or homogeneous.

Table 3. Paired Sample T-test Result

		df	Sig.(2-tailed)
Pair 1	Pretest Experiment	29	0,000
	Posttest Experiment		
Pair 2	Pretest Control	29	0,000
	Posttest Control		

Table 3 showed the result of paired sample t test for Pair 1 (Pre-test control – post-test control) that is 0.000 and for Pair 2 (pre-test experiment – post-test experiment) that is 0.000 which means it demonstrates < 0.05 meaning that there is difference of student learning outcome for two samples.

Table 4. Independent Simple t Test

		Independent Samples Test				
		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
Hasil Belajar Siswa	Equal variances assumed	.140	.709	-13.509	58	.000
	Equal variances not assumed			-13.509	57.958	.000

Table 4 presents the result of independent simple t test. The data above showed that the result of Sig(2-tailed) from Equal variances assumed was 0.000 which means < 0.05 and thus it can be concluded that there is difference of student learning outcome average between conventional learning model and learning model while applying learning media.

Table 5. N-Gain Test

		Descriptives		Statistic	Std. Error	
NGain_Persen	Kelas					
Kelas Control	Mean			28.8327	2.97384	
	95% Confidence Interval for Mean	Lower Bound			22.7605	
		Upper Bound			34.9148	
	5% Trimmed Mean			28.9675		
	Median			30.8345		
	Variance			265.312		
	Std. Deviation			16.28839		
	Minimum			.00		
	Maximum			57.14		
	Range			57.14		
	Interquartile Range			25.29		
	Skewness			-.142	.427	
	Kurtosis			-.884	.833	
	Kelas Experiment	Mean			59.7039	4.94214
95% Confidence Interval for Mean		Lower Bound			49.5961	
		Upper Bound			69.8117	
5% Trimmed Mean				60.4117		
Median				65.0000		
Variance				732.741		
Std. Deviation				27.06920		
Minimum				.00		
Maximum				100.00		
Range				100.00		
Interquartile Range				47.88		
Skewness				-.226	.427	
Kurtosis				-.895	.833	

Table 5 showed the calculation result of N-Gain test. It can be seen the comparison between control and experiment class. In control class, it showed the result of minimum score by 0.00, maximum score of 57.14, and mean score 28.8327 in which it means as not effective. While in experiment class, it showed that the minimum score of 0.00, maximum score of 100 and mean score of 59.7039 meaning that it is effective enough. It can be then concluded that learning media (experiment class) is more effective than that of lecture method (control class).

IV. CONCLUSION

The assessment result performed by the material experts obtained mean score of 95.32% regarding the content aspect and also classified as very feasible. The test result performed by media expert obtained mean score of 93.75% for efficiency

aspect, 81.66% for display aspect, 80.56% for technical aspect, and 79.16% for software aspect. The questionnaire assessment results filled by 30 students were categorized as acceptable having score of 78.75; for exercise validation was stated as valid and reliable having category as mediocre or fair.

Digital learning media is to improve students' learning outcomes by quantifying t test result and having significant score of $0.000 < 0.05$. It means that there is difference result for both classes. The mean score of effectiveness test result employing N-Gain test was 59.7039 for experiment class and 28.8327 for control class. Therefore, it can be concluded that the learning media application was categorized as effective enough while conventional method application was stated as not effective.

ACKNOWLEDGMENT

This work is supported by Universitas Muhammadiyah Surakarta (UMS).

REFERENCES

- [1] Wibawanto W, Ds SS. Desain dan Pemrograman Multimedia Pembelajaran Interaktif. Cerdas Ulet Kreatif Publisher; 2017 Jan 27.
- [2] Worang SG, Wenas MB, Prasida TA, Tanaamah AR. Perancangan Prototype Virtual Museum Keraton Kasunanan Surakarta Hadiningrat Berbasis Web. Jurnal Informatika. 2015 Jan 12;10(1): 1-11.
- [3] Lengkana AS, Supriadi C, Hermawan DB, Soleh MA. Prosiding Seminar Nasional, Sumedang: UPI Sumedang. 2017.
- [4] Pribadi BA. Desain dan Pengembangan Program Pelatihan Berbasis Kompetensi Implementasi Model ADDIE. Kencana; 2016.
- [5] Agustina C. Aplikasi Game Pendidikan Berbasis Android Untuk Memperkenalkan Pakaian Adat Indonesia. Indonesian Journal on Software Engineering (IJSE). 2015;1(1):1-8.
- [6] Ariantoro TR. Penerapan Metode Usability Pada Sistem Informasi Pelayanan Pelanggan. Jurnal Informatika. 2017 Dec 1;17(2):27-38.
- [7] Rahmanto A, Amalga SG. *Pembuatan rhythm game pada android menggunakan aplikasi construct 2 (studi kasus: game symphony angklung)* (Doctoral dissertation, Fakultas Teknik Unpas).
- [8] Hemawanto F, Thaib F, Sabiku SA. Rancang Bangun Aplikasi Edugame Museum Gorontalo Berbasis 3D. JTII (Jurnal Teknologi Informasi Indonesia). 2017 Sep 19;2(2):10-2.
- [9] Munir M. Pembelajaran Digital, Bandung: Alfabeta. 2017.
- [10] Oka GP. Media dan Multimedia Pembelajaran. Arya Oka; 2017.
- [11] Bambang Pudjoatmodjo RW. Tes Kegunaan (Usability Testing) Pada Aplikasi Kepegawaian Dengan Menggunakan System Usability Scale (Studi Kasus: Dinas Pertanian Kabupaten Bandung). In Seminar Nasional Teknologi Informasi dan Multimedia 2016 STMIK AMIKOM Yogyakarta, 6-7 Februari 2016 2016 (Vol. 37).
- [12] Supriyono H, Sudarmilah E, Fadlilah U, Rahayu ET, Purwohartono A. Rancang bangun media pembelajaran bahasa dan huruf jawa berbasis adobe flash cs6.