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Theoretical Educational Practices of Siraja Javanese Script Interactive Learning Media Based On 2D Application

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Article History	Abstract
<p>Article Submission 20 November 2020</p> <p>Revised Submission 14 January 2021</p> <p>Article Accepted 27 February 2021</p>	<p>One of the cultural heritage of the ancestors of the Indonesian nation which is priceless is traditional script. The preservation of Javanese script has been carried out by the government, one of them is by including it in the education curriculum. Javanese script is one of the basic competencies that is less understood and sought after, most students consider Javanese script difficult to learn from both pronunciation and form. Based on observations made at SD Negeri Kleco 1 that the learning method used is the conventional method, not using instructional media. This study aims to determine the feasibility of the media and the influence of the use of interactive learning media on student learning outcomes in Javanese language. This research uses the R&D method with the ADDIE model. This study uses a Matching pretest and posttest control group design. Media validity of 21 items was declared valid with an average value of a coefficient of 0.87 and perfect reliability with a result of 0.943. The material content validity of 13 items was declared valid with an average value of a coefficient of 0.91 and strong reliability with a result of 0.745. Student questionnaire assessment results are categorized as acceptable with an average value of 80%. The value of learning outcomes of the control class is smaller than that of the experimental class, which is 65.73 < 76.97. The conclusion of this research is that SIRAJA learning media is appropriate and influential in improving student learning outcomes in Javanese language, especially Javanese script material.</p> <p>Keywords: information systems, driving school, website based</p>

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Introduction

Script is one of the most valuable cultural heritage of the Indonesian predecessors. The form of the script and the art of creating it have become a relic that should always be protected and preserved (Pribadi & Prasetyo, 2016). Preservation of Javanese script has been carried out by the government, which is embedding it in the education curriculum.

Javanese script is one of the basic competencies that are not fully understood and not in demand as most students consider Javanese script difficult to learn, whether from pronunciation and letters. The majority of Javanese script learning still maintains conventional methods so that learning activities in the classroom are unattractive and unenthusiastic. It may cause students' ability in understanding Javanese scripts to decrease. Besides, it will also affect the sustainability of the script. In the future, Javanese script may be extinct and remain as history.

Research by Mala Iklimah & Yudha Anggana Agung (2018) suggest that interactive learning media using Construct 2 software obtained valid and practical results for use in the learning process of basic electronics subject. This study aims to produce interactive learning media that is feasible, practical, and able to facilitate students in understanding the learning material. Another study conducted by Maharani (2018) explains that interactive learning media using construct 2 on the topic of temperature and heat showed valid and appropriate results. This study aims to produce interactive multimedia using construct 2, to determine the feasibility of the developed media, and to determine the response of teachers and students to the use of interactive multimedia.

Based on those problems, it is necessary to develop learning media in the form of interactive multimedia that may increase student interest in learning Javanese script. Learning media using interactive media can be conducted to assist the Javanese script learning process (Haryoko, T., & Purnama, B. E., 2013) (Hakim, O. O. A. A., & Purnama, B. E., 2012).

The Javanese script learning media designed by the researchers contains the introduction of Javanese script in reading and writing and is equipped with material and evaluation of Javanese script subject. In addition, this learning media is designed with an attractive and interactive display accompanied by images, audio, animation, and simple games so that learning activities can be enjoyable. The design of Javanese script learning media is packaged simply and attractively using Construct 2 as the main software which is deemed capable of accommodating designs with a 2D environment (Sudarmilah et.al, 2013), as well as Adobe Photoshop CS6 and CorelDrawX5 as supporting software. The SIRAJA learning media is expected to increase students' attentiveness in learning and understanding of Javanese script material which can be observed from student learning outcomes.

Research Methods

This research was conducted at SD N Kleco 1 Surakarta using the Research and Development method (Sugiyono, 2015) which is defined as a research method to produce a procedural product. In this study, a development model chosen was regarded as suitable and easy to apply in developing an interactive learning media product, which is the ADDIE model. The stages of the ADDIE model are Analysis, Design, Develop, Implement, Evaluate (Pribadi, 2016) (Davis, A. L., 2013) (Jones, K. R., 2013).

Analysis was carried out to analyze the problems behind the development of interactive learning media. Data were collected by teaching and learning activities observation in the classroom, interviews with subject teachers and students.

Design, at this stage the researchers outlined product designs and development of use cases as well as activity diagrams that will be developed.

Development, at this stage researchers developed a learning media according to the initial design that has been made. The stages for the interactive learning media development comprise: 1) Developing interactive learning media using the construct 2 application and developing learning media in terms of material and design. 2) Validating learning media by media experts, material experts, and testing to students. 3) Improving learning media according to the input provided by media experts and material experts.

Implementation, the product in the form of learning media developed was implemented to the 4th-grade students of SD Negeri Kleco 1 Surakarta by using pretest-posttest to measure student learning outcomes in the control class (with conventional methods) and experimental class (with SIRAJA learning media).

Evaluation, the developed media measured learning outcomes using the media. Then a comparison was made with student learning outcomes prior to using the media.

The subjects of this study were 4th-grade students of SD Negeri Kleco 1 Surakarta with a total of 60 students, consisting of 30 students as control class (using conventional methods) and 30 students as experimental class (using learning media).

The initial data collection technique was conducted by observations and teacher interviews to find out problems in the learning process in the classroom. Testing the feasibility and effectiveness in data collection administered questionnaire (questionnaire) and pretest-posttest questions for the control class and the experimental class. The questionnaire was filled out by media experts, material experts, and students. The product feasibility test applied a validation test of materials, media, and questions. Meanwhile, student learning outcomes were determined using normality test, homogeneity test, paired t-test, independent t-test, n-gain test, and independent n-gain test.

The technique used in the content validity test is to use Aiken's V content validity coefficient. The equation of Aiken V value is described in equation 1.:

$$V = \frac{\sum s}{[n(c-1)]} \quad (1)$$

s = r - lo

lo = the lowest value of the validity assessment

c = the highest value of the validity assessment

r = number given by rater

n = number of respondents

The range of V scores that may be obtained is between 0 and 1. The higher the V number, the higher the validity value of an item is, and the lower the V number, the lower the validity value of an item is (Aiken, 1980: 957) (Arifin, 2017) (Hendryadi, 2017).

A reliability test is used to determine whether an instrument used to obtain information can be trusted to disclose information in the field as a data collection tool. This test applied Cronbach's Alpha (Sugiyono, 2017) (Bonett, D. G., & Wright, T. A., 2015) (Panayides, P. 2013) as shown in Table 1.

Cronbach's Alpha Range	Decision
$\alpha \geq 0,9$	Perfect Reliability
$0,7 \leq \alpha < 0,9$	Strong Reliability
$0,6 \leq \alpha < 0,7$	Adequate Reliability
$0,5 \leq \alpha < 0,6$	Moderate Reliability
$\alpha < 0,6$	Low Reliability

(Source: adapted from sugiyono, 2017)

Quantitative data were obtained from a questionnaire that had been filled out by media experts and material experts to test a product's feasibility. The data obtained from media experts and admins will be processed and used as a percentage value as the final result (Sugiyono, 2017: 199) as shown in Table 2.

Table 2. Interpretation Percentage Range

Achievement Percentage	Interpretation
81% - 100%	Very Feasible
61% - 80%	Feasible
41% - 60%	Feasible Enough
21% - 40%	Less Feasible
1% - 20%	Not Feasible

(Source: adapted from sugiyono, 2017)

The usability test was carried out using a questionnaire method. Questionnaires were distributed to 4th-grade students at SD Negeri 1 Kleco Surakarta. The questionnaire used refers to the system usability scale (SUS) questionnaire by John Brooke. The questionnaire has positive and negative value questions.

The SUS score ranges from 0 to 100 (Brooke 1996). The SUS score obtained is calculated on average using equation 2.

$$\bar{x} = \frac{\sum s}{N} \quad (2)$$

\bar{x} = Mean

$\sum x$ = Total Score

N = Number of Respondent

After obtaining the SUS mean, then the predicate of the product results was determined based on the SUS table obtained from John Brooke (1996) in Figure 1.

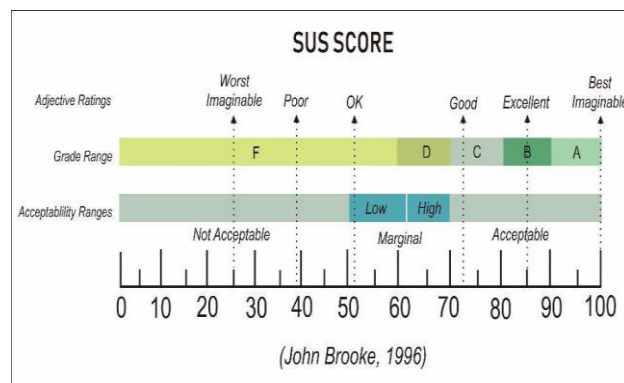


Figure 1: SUS Score

(Source: adapted from John Brooke 1996)

The N-Gain test aims to determine the effectiveness of using a method in research. The N-Gain test score is the difference between the pre-test and post-test scores. The formula used in calculating N-Gain is as follows:

$$N \text{ Gain} = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}} \quad (3)$$

Results And Discussion

Results of Learning Media Development

Product development based on wireframes. The following are the results of the development of learning media products that have been attempted by researchers.



Figure 2: Display of the SIRAJA Main Menu

Figure 2 is the display of SIRAJA learning media main menu. In this display, there are several menus, such as "tujuan!" menu which contains indicators or learning objectives, the menu "Ayo Sinau!" that includes material about Javanese script, the menu "ayo dolan!" is for games and "ayo leren!" menu which is used to stop or exit the SIRAJA learning media. In the upper right corner, there are 2 buttons, "petunjuk" button for the description of the SIRAJA learning media, and the "about" button containing information or biodata from the SIRAJA learning media creators. The button located in the lower-left corner is the setting button used to adjust backsound in the media.



Figure 3: Menu Display "Ayo Sinau!"

Figure 3 is a display of the "Ayo Sinau!" menu which contains several options of Javanese script learning materials. There are 4 choices of learning materials; carakan script, swara script, sandhangan swara script, and wilangan.



Figure 4: Display of the Carakan Script Material

Figure 4 is a display of how to characterize the material. There are 20 clickable character script buttons. If one of the letter buttons from the Carakan script is clicked, information from the Carakan script will appear such as Latin script and the Play button to find out the sound of the Carakan script in the preview display on the right. The red cross button located in the upper right corner is used to return or end Carakan script learning. Meanwhile, the instructions button located next to the red cross button is used to find out instructions for the operation of learning media on the Carakan script material.



Figure 5: Level Menu Display

Figure 5 is a display of the level menu. There are 3 levels to choose from, level 2 and 3 are locked or cannot be accessed. To unlock level 2, the user must complete the game mission at level 1 and so on up to level 3. Each level has a different mission or problem.



Figure 6: Level 1 Display and Level 1 popup

Figure 6 is a display of the level 1 mission popup and the game at level 1. The mission at level 1 is "maca buku" provided with 3 lives. The user is required to find 3 keys located behind the letters of the Javanese script that compose the words "maca buku". The time allotted to complete the mission is 2 minutes.



Figure 7: Win and lose game popup display
(Source: Product Development Results)

Figure 7 is a popup display for winning and losing games. This win popup will appear when the game has finished as the user wins or the mission has been successfully completed. While the game lose popup will appear when the game has finished because time or lives run out before the mission is completed. In the win and lose popup display, it shows the coins earned while playing and the remaining time.

Media Expert Rating

The media expert assessment was carried out by three respondents, they were lecturers of the Universitas Muhammadiyah Surakarta that obtained the following results:

$$Mean = \frac{18,33}{21} = 0,87$$

The limit table for Aiken V is 21 items with a lower limit of 0.64 to an upper limit of 0.93 or a V value of 0.83. The results above show that 21 items had a V value of 0.87. Then the content validity obtained is declared valid because it is in accordance with the Aiken limit table. The results of the media expert test reliability are shown in Table 3.

Table 3: Media expert reliability test results

Cronbach's Alpha	N of Items
.943	21

Table 3 shows that 21 items had a Cronbach alpha of 0.943. As per Cronbach's alpha range, the value of $\alpha \geq 0,9$, the results are declared perfect reliability.

Figure 8 shows the mean of the 21 items, each of which had an interpretation percentage above 67%, so it can be determined that all items are eligible to be reused as instruments.

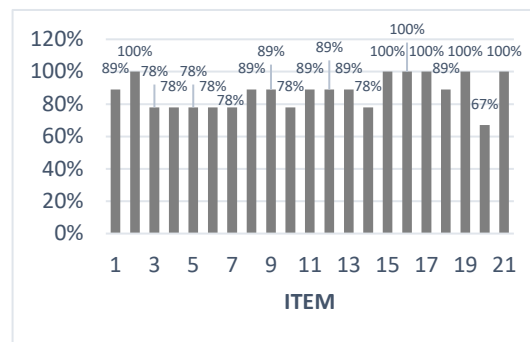


Figure 8: Graph of Media Expert Interpretation Percentage

Material Expert Assessment

The material expert assessment was conducted by three respondents, they were SD Negeri Kleco 1 Surakarta teachers and Elementary School Teacher Education (PGSD) alumni of the Universitas Muhammadiyah Surakarta that obtained the following results:

$$Mean = \frac{11,89}{13} = 0,91$$

Based on the limit table for Aiken V, 13 items are subject to a lower limit of 0.64 to an upper limit of 0.93 or the value of V reached 0.83. The results above indicate that the 13 items had a V value of 0.91. Then the content validity obtained is declared valid because it is in accordance with the Aiken limit table. The results of the material expert test reliability are as shown in Table 4.

Table 4: Reliability Test Results of Material Experts

Cronbach's Alpha	N of Items
.745	13

Table 4 shows that the 13 items had a Cronbach alpha of 0.745. In accordance with the range of Cronbach's alpha value of $0.7 < 0.9$ then the results are declared to have strong reliability.

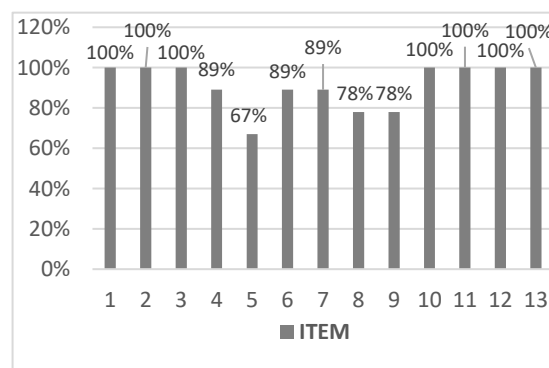


Figure 9: Graph of Material Expert Interpretation Percentage

Figure 9 signifies that the average of the 13 items had an interpretation percentage above 67%, meaning that all items are eligible to be reused as an instrument.

User or Student Rating

The user assessment was completed by fourth-grade students at SD Negeri 1 Kleco Surakarta with a total of 30 students. The mean results obtained are as follows:

$$Nilai\ rata - rata = \frac{2410}{30} = 80,3$$

The data above implies the average student assessment results obtained through a questionnaire using the System Usability Scale (SUS) calculation, which contains 10 statements.

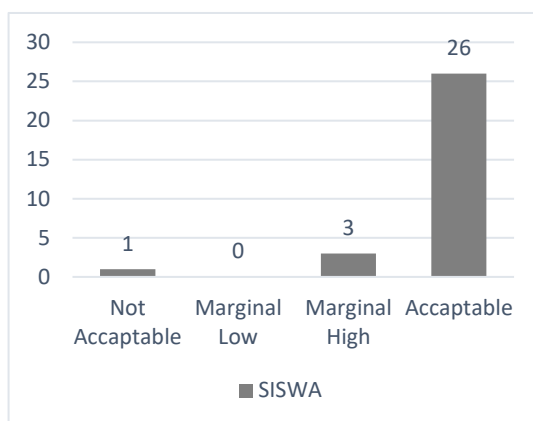


Figure 10: Results of SUS Test

Based on Figure 10, the calculation of student questionnaires obtained a mean of 80.33. The mean SUS of 80.33 is included in the Acceptable category, which indicates 1 person for not acceptable, 0 or none for marginal low, 3 people for marginal high, and 26 people for acceptable. It interprets that the developed learning media "SIRAJA" can be accepted by users (students) well in terms of usability aspects.

Pretest-Posttest Question Test

This validity test aims to determine the level of validity or invalidity of each item. Validity testing was carried out using the SPSS program. Items declared valid were obtained from the instrument reliability values such as Table 5:

Table 5: Reliability results of multiple-choice questions

Cronbach's Alpha	N of Items
.641	12

Table 5 shows that the 12 multiple-choice items earned a Cronbach alpha value of 0.641. In accordance with the range of Cronbach's alpha value of $0.6 < 0.7$, the results are declared to have enough reliability.

Normality test

Researchers conducted a normality test to find out all the data obtained were normally distributed or not normally distributed. Kolmogorov-Smirnov/Shapiro-Wilk was utilized and the calculations were accomplished using the SPSS program. If a significant value < 0.05 means that it is not normal, while a significant value > 0.05 is deemed to be normal. The results of the calculation of the normality test obtained are as shown in Table 6:

Table 6: Pretest and Posttest Normality Test

	Statistic	df	Sig.
Pretest_control	.156	30	.062
Posttest_control	.158	30	.054
Pretest_experiment	.191	30	.062
Posttest_experiment	.175	30	.108

Based on Table 6, the results of the normality test show that the pretest and posttest data in the control and experimental classes had a significant value > 0.05 , meaning that the data is normally

distributed.

Homogeneity test

Homogeneity test was done after finding the level of normality of the data distribution. This test aims to determine the level of similarity of variance between the two classes, which are control and experiment. The results of the homogeneity test obtained are presented in Table 7.

To determine whether to accept or reject the hypothesis, it is decided from the significant value in Levene Statistics. The pretest and posttest data in Table 7 show a sig value > 0.05 , so it is considered that this study has a homogeneous variant.

Table 7: Results of Homogeneity Test

Student Learning Outcome	Levene Statistic	df1	df2	Sig .
Student Learning Outcome Based on Mean	1.711	1	58	.196
Based on Median	1.200	1	58	.278
Based on Median and with adjusted df	1.200	1	52.948	.278
Based on trimmed mean	1.571	1	58	.215

Hypothesis testing

Paired Sample t-test was conducted to determine whether there was a difference in the average of the two paired samples. Paired Sample t-test was employed to determine whether there was a difference in the average of the two paired samples.

Table 8: Results of the Paired Sample T-Test

	Paired Differencesz		Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig.(2-tailed)
	Mean	Std.Deviation		Lower	Upper			
Pair 1 Pretest_Eksperiment- Protest_Eksperiment	-30.867	10.241	1.870	-34.691	-27.043	-16.509	29	.000
Pair 2 Pretest_Kontrol- Posttest_Kontrol	-20.733	10.092	1.843	-24.502	-16.965	-11.252	29	.000

Based on table 8, the results of the paired sample t-test determine that the significant value of pair 1 (pretest experiment and posttest experiment) and pair 2 (pretest control and posttest control) was 0.00. The results obtained from the two pairs show the same significant value, namely $0.00 < 0.05$. Thus, it can be determined that there was a difference in the average student learning outcomes for the experimental pretest with experimental posttest and pretest control with posttest control.

The next stage is to administer the Independent Sample t-test to determine whether or not there was a difference in the average of the two unpaired samples. This test was necessary to determine the differences in student learning outcomes in Javanese language subject between those who use SIRAJA learning media and those who use the conventional method (lectures). The results of the Independent Sample t-test yielded as shown in Table 9.

Table 9: Results of Independent Sample 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	1.711	.196	-4.415	58	.000
	Equal Variances not assumed			-4.415	55.265	.000

Based on Table 9, the results of the Independent Sample t-test for the posttest of both classes, which are control and experiment, showed a significant value (2-tailed) < 0.005 . It implies that there was a difference in the average student learning outcomes between the use of SIRAJA learning media learning method and the conventional learning method (lecture).

N-Gain Test

Normalized gain test was done to determine the effectiveness of using a method in research. The N-Gain test score is the difference between the pre-test and post-test scores. Below are the results of the normalized gain (N-Gain) test:

Based on Table 10, the N-Gain mean for the control class was 36.25 or 36.25%, which is categorized as ineffective with a maximum N-Gain score of 59.70 and a minimum of 14.89. Meanwhile, the experimental class obtained a mean of 58.40 or 58.40% which was included in the quite effective category with a maximum N-Gain score of 100.00 and a minimum of 29.79.

Table 10: N-GainTest Results

		Kelas	Statistic	Std.Error	
Kelas control	Mean		36.2594	2.15472	
	95% Confidence Interval	Lower Bound	31.8525		
		Upper Bound	40.6663		
	5% Trimmed Mean		36.1352		
	Median		35.6164		
	Variance		139.285		
	Std.Deviation		11.80189		
	Minimum		14.89		
	Maximum		59.70		
	Range		44.81		
	Interquartile Range		14.94		
	Skewness		.299	-.427	
	Kuortosis		-.282	.833	
	Kelas experiment	Mean		58.4055	3.08976
		95% Confidence Interval	Lower Bound	52.0863	
		Upper Bound	64.7248		
5% Trimmed Mean			57.5374		
Median			57.5113		
Variance			286.398		
Std.Deviation			16.92329		
Minimum			29.79		
Maximum			100.00		
Range			70.21		

Conclusion

The product developed from this research is interactive multimedia-based learning media in Javanese language subject of Javanese script material for fourth-grade students of elementary school. This interactive learning media is called SIRAJA or an abbreviation of Sinau Aksara Jawa.

The software used in the development of this learning media is Construct 2.

SIRAJA learning media may increase students' interest and learning outcomes in learning Javanese script, as shown by an increase in the pretest-posttest scores of the experimental class. The use of SIRAJA learning media is feasible and more effective than using conventional methods (lectures).

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