

The Effectiveness of Android-Based 2D Mobile Learning Teaching Materials on Indonesian Language Subject in Elementary School

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Abstract: One of the competencies that must be mastered in the 21st century is having the ability to use technology. In this digital era, the use of technology has become a basic need that pervades every joint of human life. Therefore, innovation in learning is needed to support and facilitate students in carrying out learning so students are able to keep up with the times. The focus of this study is on the effectiveness of the use of Android-based 2D mobile learning teaching materials which are the result of the development of the Indonesian language teaching material digitalization program in elementary schools. The purpose of this study was to determine the effectiveness of Android-based 2D mobile learning teaching materials on Indonesian language subjects in elementary schools. The method used in this study was a quasi experiment using control class and experimental class. The results of the study show that the value of Mann-Whitney U produced is 72.50. Sig value. (2-tailed) obtained at 0.00. Apparently the acquisition of Sig. (2-tailed) smaller than the actual level proposed at 0.05 (0.00 < 0.05). Thus, it can be proven that there is a significant difference between the posttest of Indonesian learning achievement in the experimental class and the control class. The important point in this research is as a means of innovation in the form of digitizing teaching materials for elementary school students.

Keywords: android-based 2D learning materials, Indonesian language learning

INTRODUCTION

In the context of 21st century education, learning should be developed and integrated into the concept of literacy learning which is seen as a condition to better direct literacy, literacy, literacy, and literacy (Abidin, 2015). In the 21st century, education should direct students to have the skills to learn and innovate, use skills information technology and media, and can work, critical thinking skills, collaborate, communicate and survive with use skills for life (*life skills*) (Trilling and Fadel, 2009, Morocco et al, 2008). Responding to the development of education in the 21st century, at least three educational concept in the 21st century is the 21st Century Skills (1) *life and career*skills,(2) *learning and innovation skills*, and (3) *Information media and technology skills* (Trilling and Fadel, 2009).

The results of the tests and the PISA survey, which in 2015 involved 540,000 students in 70 countries showed that Singapore was a country that was ranked number 1 for all three science, reading and mathematics materials. While the performance of Indonesian students is still relatively low. In a row the average scores of Indonesian students' achievement for science, reading, and mathematics were ranked 62, 61, and 63 from 69 countries evaluated (OECD, 2015). Seeing from the main indicators in the form of the average score of achievement of Indonesian students in the fields of science, mathematics, and science is indeed worrying. Therefore, the use of teaching materials needs to be developed to suit the level of student development in accordance with the demands of the development of the industrial revolution 4.0. The quality of learning will be obtained through teacher creativity in creating a classroom atmosphere and learning device. Quality teaching materials will be achieved with effective,

atmosphere and learning device. Quality teaching materials will be achieved with effective, interesting and fun learning (Putrawansyah, Ferry, Zulkardi, Sardianto, 2016; Tekerek, M. & Tekerek, 2018).

Cellular technology-based learning is the packaging of innovative learning today along with the development of the industrial revolution 4.0 using mobile devices or smartphones (Maleko Munguatosha, G., Birevu Muyinda, P., & Thaddeus Lubega, J., 2011; Alhassan R., 2016) . Students are able to learn not to know space and time, anytime and anywhere students can use cellular technology media to learn (Kaliisa & Picard: 2017; Dai Guiyu, Liu Yang & Cui Shanmeng, 2018). By using mobile learning, students are able to access various kinds of learning resources that are available and this is a very promising approach to increasing access to education in developing countries (Davison & Lazaros, 2015; Maleko Munguatosha, Muyinda, Lubega, 2011). Thus mobile learning is very effectively used in learning as a supporting element of learning (Demir & Akpinar, 2018).

Efforts to develop-based teaching materials were Android carried out by several researchers. In the field of Indonesian language at elementary school developed by Ernalis, Syahrudin, and Abidin who stated that "the teaching material model based on the developed learning model has been proven to effectively improve listening and reading skills, and effectively develop students' character during the learning process (Ernalis, Syahruddin and Abidin, 2016). Furthermore, Muntari (2016) the results achieved showed that reading textbooks based on the Dick and Carey models were considered effective and feasible and were practically used for teaching reading in schools. Furthermore, the results of the study by Owon (2017) state that teaching text writing materials can effectively improve students' writing skills and be able to develop text in accordance with the structure, content, spelling, punctuation, and the use of capital letters. The results of the development of teaching materials in other studies were carried out by Shodiqin and Zuhri (2015). Shodiqin and Zuhri (2015) concluded that the use of tabloid high school mathematics teaching materials assisted by Wolfram Mathematica software with a more effective contextual approach to improve learning outcomes in the learning process. by Ruslinawati and Gustiana (2017) who concluded that Electronic Learning Materials (BAE) were *flipbook* -basedbased on problem-solving skills with the CTL approach to mathematics learning Class V Elementary School There was an increase in scores obtained by students at the stage of understanding problems, developing plans, implementing plans, and looking back. Furthermore, the results of the research conducted by Susanti (2015) the development of contextual based mathematics teaching materials using the Borg and Gall model are said to be valid and effective, and able to improve learning outcomes for learning in class IV integer material.

Based on the previous research above, researchers conducted research by developing Android-based mobile learning teaching materials on Indonesian language subjects with the aim of improving learning achievement and language skills of elementary school students.

METHOD

The research method used in this study is a quasi experiment method. The research design used in this study was Pretest Posttest Control Group Design. In the design of this study there are two classes, namely select control group and select experimental group (Creswell, 2008: 314).

Determination of the sample in this study was carried out by *purposive sampling* by taking subjects tailored to the purpose of the study. The experimental class was treated in the form of the use of Android-based 2D mobile learning teaching materials, while the control class did not



use 2D Android-based mobile learning teaching materials. Both classes were given *pre-test* and *post-test* using the same test instrument. The description of the design of this study can be seen in Figure 1 following.

select control group		Pre test	Pre test No treatment	
	select experimental	Pre test	Experimental	Post test
	group		treatment	

Figure 1. Quasi-Exsperiment pre- and post test design (Creswell, 2008: 314)

Description:

- Eksperimental treatment: using mobile learning teaching materials based 2D android
- No treatment: not using 2D Android-based mobile learning teaching materials.

The instruments used in this study are multiple chois and descriptions. The question is used to determine the extent of learning outcomes on Indonesian language students 2D Android-based mobile learning teaching materials.

The data obtained in this study are qualitative and quantitative data, namely in the form of data from the observation of the implementation of learning, as well as theseores *pre-test and post-test* of learning outcomes on Indonesian subjects.

RESULTS AND DISCUSSION

After analyzing the data on descriptive statistical quantities, statistics will be obtained as listed in the following Table 1.

		Pretes			
		Learning			
		Outcomes			
N Valid		251			
	Missing	0			
Mean		12,3580			
Median		12,0000			
Std. Dev	iation	2,11133			
Variance	•	4,458			
Range		8,00			
Minimur	n	9,00			
Maximu	m	17,00			

Table 1. Results of Pretest Data Processing Experimental Class Learning Outcomes

Based on the table above, the score distribution was obtained as a result of a study of 81 students, obtained a score of at least 9 and a maximum of 17. The range which is the maximum score minus the minimum score is 8, meaning the distance between the smallest score to the biggest score is 8 units of score. The average score of student learning outcomes at pretest is 12.36. The standard deviation is 2.11, meaning that the distribution of scores obtained is 2.11 around the average score. Distribution of research data can be presented as shown in the following figure.





Figure 2. Histogram Data Pretest Results of Experimental Class Learning

Based on the picture above, it can be stated that the pretest scores of learning outcomes are distributed from 9 to 17. This distribution can be said to be quite normal in line with the normality line found in the image. But in terms of the average obtained, the ability of the experimental class students in Creative Thinking is still categorized as low.

1) Post-Results Data

After analyzing the data on descriptive statistical quantities, statistics will be obtained as listed in the following table.

		Postest Learning Outcomes	
N	Valid	81	
	Missing	0	
Mean		19,4321	
Median		18,0000	
Std. Dev	iation	5,86715	
Variance		34,423	
Range		52,00	
Minimum		14,00	
Maximum		66,00	

Table 2. Experiment Results of Postes Data Processing Results of Experimental Class Learning

Based on the table above, the score distribution was obtained as a result of a study of 81 students, obtained a minimum score of 14 and a maximum of 66. The range which is the maximum score minus the minimum score is 52, meaning that the smallest score to the largest score is 52 units of score. The average score of student learning outcomes during posttest is 19.43. The standard deviation is 5.87, meaning that the distribution of scores obtained is 5.87 around the average score.

Distribution of research data can be presented as shown in the following figure.





Figure 3. Experiment Histogram of Postest Data of Experimental Class Learning Results

Based on the picture above, it can be stated that the posttest scores of student learning are distributed from 14 to 66. This distribution can be said to be quite normal in line with the normality line found in the image. Judging from the average obtained during posttest, student learning outcomes in the experimental class have experienced an increase compared to the average score at the time of pretest. The score of the post test results can be categorized very high.

a) Control Class

i) Pretest Results Data

Based on the results of data processing and after analyzing the data on descriptive statistical quantities, statistical figures can be obtained as follows.

		Pretest Learning Outcomes
N Valid		81
	Missing	0
Mean		12,1235
Median		12,0000
Std. Dev	iation	2,21575
Variance		4,910
Range		9,00
Minimur	n	7,00
Maximu	m	16,00

Table 3. Results of Data Processing of Student Learning Outcomes in Indonesian Language

Based on the table above, obtained the distribution of scores as a result of research on a number of 81 students, obtained an average score of student learning outcomes at the time of pretest was 12.12. The standard deviation is 2.21, meaning the distribution of scores obtained is 2.21 around the average score. Distribution of research data can be presented as shown in the following figure.





Figure 4. Histogram Data Pretest of Control Class Learning Results

Based on the picture above, it can be stated that the pretest scores of students' learning are distributed from 7 to 16. This distribution can be said to be quite normal in line with the normality line found in the picture. If seen from the average obtained at pretest, the ability of control class students in learning outcomes is still categorized as low.

ii) Post-Test Results Data

Here are the results of data analysis on descriptive statistical quantities, the statistics will be obtained as follows.

		Postest Learning	
		Outcomes	
Ν	Valid	81	
	Missing	0	
Mean		15,6914	
Median		15,0000	
Std. Deviation		5,64279	
Variance		31,841	
Range		51,00	
Minimum		10,00	
Maximum		61,00	

Table 4. Data Processing Results Postest the Control Class Learning Outcomes

Based on the table above, the distribution of the average score of student learning outcomes during posttest was 15.69. The standard deviation is 5.64, meaning that the distribution of scores obtained is 5.64 around the average score.

Distribution of research data can be presented as shown in the following figure.





Figure 5. Histogram of Postes Data of Control Class Learning Results

Based on the above picture, it can be stated that the student posttest scores are distributed from 10 to 61. This distribution can be said to be quite normal in line with the normality line found in the picture. Judging from the average obtained during posttest student learning outcomes in the control class has experienced an increase compared to the average score at the time of pretest. However, the results of the postes can be categorized as sufficient.

Based on the results of normality test data processing using the Chi Square Test on student learning outcomes data obtained statistical quantities as follows.

		U	•	
	Pretest -		Postest -	
	Eksperimen	Pretest - Control	Experiment	Postest - Control
Chi-square	18,667 ^a	33,691 [°]	38,259 ^b	41,815 ^b
df	5	6	6	7
Asymp. Sig.	,000	,000	,000	,000

Table 5. Learning Results Normality Test Results

Based on the above normality test table, it can be seen that the Chi Square value for the four data that has been tested on the distribution of research data is equal to 18.67, 33.69, 38.26, and 41.81. The value of df or the degree of freedom is obtained by a value of 5, 6, 6 and 7. While the value of Asymp. Sig on the four data above is obtained by 0.00, 0.00, 0.00, and 0.00. It turns out that the value of Asymp. Sig. smaller than the specified level (α) which is set at 0.05. Thus, the four groups of data are categorized as not normally distributed.

Looking at the case above, the Chi Square Test produces data that is not normally distributed. So it is necessary to do a non-parametric statistical test using the Man-Whiteney U test. This test aims to determine the level of homogeneity (similarity of abilities) at the pretest and posttest stage between the experimental class and the control class in student learning outcomes.

The results of the two pretest tests between the experimental class and the control class using the Man-Whiteney U test obtained the following results.



Mann-Whitney U	Score 3157,500		Class	N	Mean Rank	Sum o Rank
Wilcoxon W	6478,500	Nilai	Pretes Eksperimen	81	83,02	6724
Z	-,416		Pretes Kontrol	81	79,98	6478
Asymp. Sig. (2-tailed)	,677		Total	162		

Table 6. Man-Whiteney U Test Results Study Results Pretest Data between Experimental Classes and Control Classes

Based on the table above it is known that the resulting Mann-Whitney U value is 3157.50. Sig value. (2-tailed) obtained at 0.677. Apparently the acquisition of Sig. (2-tailed) greater than the real level proposed at 0.05 (0.677> 0.05). Thus, it can be proven that there is no significant difference between the pretest of student learning outcomes in the experimental class and the control class. Another proof is reinforced by the value of Mean Rank between the pretest of the experimental class and the pretest of the control class which is in the experimental class of 83.02 while the posttest reaches 79.98 with the difference of 3.04.

The test results of two posttest averages between the experimental class and the control class using the Man-Whiteney U test obtained the following results.

 Table 7. Man-Whiteney Test Results U Study Results Postes Data between Experimental

 Classes and Control Classes

	Score
Mann-Whitney U	1141,000
Wilcoxon W	4462,000
Ζ	-7,207
Asymp. Sig. (2- tailed)	,000

	Class	N	Mean	Sum of
	Class	19	Rank	Ranks
Nilai	Pretes	81	107,91	8741,00
	Eksperimen			
	Pretes Kontrol	81	55,09	4462,00
	Total	162		

Based on the table above it is known that the Mann-Whitney U value generated is 1141.00. Sig value. (2-tailed) obtained at 0.00. Apparently the acquisition of Sig. (2-tailed) smaller than the actual level proposed at 0.05 (0.00 < 0.05). Thus, it can be proven that there are significant differences between the posttest of student learning outcomes in the experimental class and the control class. Other evidences were strengthened by the value of Mean Rank between the posttest of the experimental class and the posttest of the control class, namely in the experimental class of 107.91 while the posttest reached 55.09 with the difference in magnitude of 52.82. Seeing the achievement of the Mann-Whitney U test means that the use of Android-based 2D mobile learning teaching materials in the experimental class and other models in the control class has had a positive influence on improving student learning outcomes.

Based on the above research results, the use of mobile learning can increase student enthusiasm and motivation to learn (Hidayat 2016). The use of mobile learning students are able to access learning material anytime and anywhere (Aprianti: 2011). Learning by using information technology can make students interested in learning. The nature of mobile learning that is based on open source, makes everyone able to develop and use it in accordance with the wants and needs of learning (Belina & Coal, 2013: 76). By using an Android-based application, students can learn not only at school, but can be done anywhere and anytime. The teaching and learning process will run more easily and be able to improve the quality of learning (Aripurnamayana: 2016). The use of smartphones as media makes the main attraction for



students. During this time students use smartphones only to play social media or online games. With packaged teaching materials based on Android and can be accessed through student smartphones, more or less provides a direct learning experience and provides a diversion of students' attention to reduce the use of smartphones to play online games and social media. The advantage of using Android is being able to make a comprehensive approach, which is open source, free platform, and populist operating system (Zuliana and Irwan Padli, 2013: 2)

CONCLUSION

Based on the results of the study, the use of Android-based 2D learning teaching materials is able to provide effectiveness in learning Indonesian in grade V elementary school students. The use of mobile learning applications can increase student learning enthusiasm so students are motivated to learn in class. The use of cellphones which in daily life of students is only used for playing games, watching youtube, and playing social media today can divert students' attention to learning. Based on the results of the Mann-Whitney U test, the result is 1141.00. Sig value. (2-tailed) obtained at 0.00. Obtaining Sig. (2-tailed) smaller than the actual level proposed at 0.05 (0.00 < 0.05). Thus, it can be proven that there are significant differences between the posttest of student learning outcomes in the experimental class and the control class. Other evidences were strengthened by the value of Mean Rank between the posttest of the experimental class of 107.91 while the posttest reached 55.09 with the difference in magnitude of 52.82.

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