
THE EFFECT OF USING ANDROID-BASED LEARNING MEDIA IN INCREASING MOTIVATION AND PHYSICS LEARNING OUTCOMES

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Abstract

The aims of this research study are to analyze change in learning outcomes and student motivation in class X science high school students using android-based learning media and evaluation android-based learning media effect on the physics learning outcomes for class X science high school students. The methods will be using is Quasi-experiment research design with Pretest-Posttest Control Group. The Population and sample of this research is student class X MIA SMA Al-Ulum Terpadu. Questionnaire and instrument test will be used as instrument. The academic performance of the students in this research is limited to increasing motivation and enhancing students learning outcomes in order to assess the product's usefulness. The result of data analysis were the average pretest value for control class was 60.19 and for experimental class was 73.81, after given treatment, the post-test mean value for control class was 88,75 and for experimental class was 90.16. Based on the results, the student's N-Gain, motivation and MANOVA test, the results of the hypothesis obtained are Sig. > 0.05 (0.114, 0.344 > 0.05) which means H0 accepted and H1 is rejected. As a result, utilizing android-based learning media did not have a substantial impact on improving student learning outcomes and motivation.

Keywords: Learning Media, Android, Learning Outcome, Learning Motivation

The scientific approach in the 2013 Curriculum emphasizes the modern pedagogic dimension in learning using a scientific approach. The use of appropriate learning media is one of the efforts that can be made by someone to improve the quality of learning. By using the right learning media can also help students be more focus on receiving the content of learning materials. Learning media evolves in lockstep with technological advancements.

In today's global society, the rapid development and advancement of technology, information, and communication (ICT) has a significant impact on the process of producing educational activities in Indonesia that use technology as a learning medium. With the advancement of ICT in the field of education in Indonesia, educational institutions will eventually be compelled to adjust to shifts in the educational paradigm from conventional to globalization-era education, which is replete with technology.

Almost all high school students can use existing technology, particularly cellphones, or as they are now more commonly known, smartphones in this current globalization era. Smartphone is one of the technical devices that serves as a communication tool that is inextricably linked to daily life. Smartphones running the Android operating system are the consequence of the

evolution of cellphones, in which smartphones are created with additional functions not found in telephones, making it easier for users to communicate and access information and have so many interesting features and conveniences, include use them as learning media. According to Rahmelina's (2014) research, learning media can improve student learning outcomes in the learning process. As a result, in this globalization era, teachers must be more creative in utilizing existing technology and creating interesting and colorful learning media in ICT (Information Communication and Technology) based classes.

The Android operating system is currently one of the most popular and extensively utilized operating systems among the general population, particularly among high school students. However, according the answer of quick interviews with teacher at Al-Ulum School, the use of smartphone as a learning media began in response to the COVID-19 pandemic, which necessitated online learning and has been using google classroom. This indicates that if the COVID-19 pandemic does not occur, the use of smartphone as an android-based learning media has most certainly been underutilized. This indicates that if the COVID-19 pandemic does not occur, the use of smartphone as an android-based learning media has most certainly been underutilized. Under the Minimum Completeness Criteria (KKM) is 80, students learning outcome have so far been neither too high nor too low which have an average test between 80-85 and just few students have shown enthusiasm during the learning process. Android-based learning media can be an innovative learning media that is suited for use in the classroom by changing the habits and lifestyles of students in the current era of globalization. According to Faqih (2020) research, students genuinely want more current and easy-to-use media.

Additionally, Yektyastuti & Ikhsan (2016) discovered that Android-based learning media developed can increase students' learning motivation. In other words, using smartphones as learning media can improve cognitive, metacognitive, affective, and socio-cultural dimensions. Smartphones and tablets have the potential to change the way people study. According to Fatimah & Mufti (2014), this type of learning media makes learning more interesting, students can learn material without being constrained by time or place, and there are interesting applications, so it will have a positive impact on students' use of Android-based smartphones as a learning media tool. Based on that, the aim of this research are to analyze effect of android-based learning media and changes in the physics learning outcomes of class X science high school students. The android media that will be used is power point media using ISpring which then converted into an android application using Website 2 APK Builder Pro.

METHOD

This research is a study to test the effect of media learning using experimental research methods using a *Quasi-experimental research*. In this research, the sample will be divided into two groups, they are experimental group and the control group. The research method used was the *Pretest-Posttest Control Group Design* where experimental group and control group which were selected randomly. Both groups were given, furthermore different treatments will be given, then tboth group will be given a posttest at the end of the lesson.

Questionnaire and test instrument are the two types of instruments that will be implemented in this research. For the pretest, will be used multiple choice test for instrument test and essay test for the post-test. The questions utilized are from the previous UN and questionnaire instrument will be used as a measure of student motivation during the physics learning process using of android as a physics learning media tool during the learning process.

The steps done in this research are as follows: (1) Observation (2) instrument creation (3) instrument validation (5) pretest provision (6) Treatment (7) Questionnaire and Posttest provision.

RESULT AND DISCUSSION

The research was conducted at Integrated Al-Ulum Islamic Medan in 2022 with two class samples, namely class X MIA 1 and X MIA 2. This research's type is quasi-experiment research involving two classes which given different treatments, they are control class and experimental class where the control class does learning without using android while the experimental class does learning using android. Class selection was done by simple random sampling to determine the control class and experimental class where class X MIA 1 as control class and class X MIA 2 as experimental class.

The independent variables in this study were the use of android and without the use of android and student motivation during the learning process, while the dependent variable is learning Physics outcomes. The results of data collection are then calculated for differences in learning outcomes for students to determine the effect of using Android for Physics lessons on students in class X MIA in the 2021/2022 academic year.

Description of Research Data Pretest and Posttest Control and Experimental Class

The student learning outcomes data were obtained from two classes, they are control and experimental class totalling 32 students for each group. Both classes were given an initial ability test, such as pretest at the start research to determine the initial ability of two classes before being provided treatment. Following the pretest, experimental class was provided treatment for using android-based learning media as tool in learning process, whereas the control class received learning media usually used by teachers. After being given treatment, the two classes were given post-test with the same questions but it was in essay form. If the pre-test questions are in the form of multiple choice questions, the post-test questions are in the form of essays.

The recapitulation of pre-test and post-test data from the control and experimental classes using SPSS 16.0 for windows is shown in Table 1 as follows:

Table 1 Pre-test and Post-Test Result Data for Control and Experimental Classes

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Pre-test Control	32	0	92	60.19	30.557	933.706
Pre-test Experiment	32	17	92	73.81	23.283	542.093
Post-test Control	32	53	100	88.75	12.155	147.742
Post-test Experiment	32	83	100	90.16	4.732	22.394
Valid N (listwise)	32					

In table 1 can interpreted that the results of the pretest of the control class and the experimental class have a not too significant difference with the average value of each class being 60.19 and 73.81 while the post-test between the control class and the experimental class is quite significant where the average value the experimental class is higher than the control class, with the average value of each class is 88.75 and 90.16.

Students' learning outcomes were assessed at the start of learning via a pretest and at the conclusion of learning via a posttest (post-test). The N-Gain data from the control and experimental classes using SPSS 16.0 for windows is shown in Table 2 as follows:

Table 2 N-Gain Data for Control and Experimental Classes

	Class	Statistic	Std. Error
Ngain_Score_Persen	Control	Mean	53.4903
		Minimum	-112.50
		Maximum	100.00
	Experiment	Mean	33.3062
		Minimum	-87.50
		Maximum	100.00

Based on table 2, the results of the N-Gain test calculation in the table, it shows that the average N-Gain score for the control class is 53.5%, including the medium category or less effective. With a minimum N-Gain score of -112.5% (decreased value) and a maximum of 100%. Meanwhile, the average N-Gain score for the experimental class is 33.30%, including medium or less effective. With a minimum N-Gain score of -87.50% (decreased in value) and a maximum of 100%.

Table 3 Frequency Distribution of Student Motivation Questionnaires Result

Class	Category	Frequency	Percentage
Control Class	Less ($X < 41$)	10	31,25%
	Enough ($41 \geq X \leq 47$)	14	43,75 %
	Good ($X > 47$)	8	25 %
	Total	32	100%
Experiment Class	Less ($X < 41$)	6	18,75 %
	Enough ($41 \geq X \leq 47$)	22	68,75 %
	Good ($X > 47$)	4	12,5 %
	Total	32	100%

In table 3, the questionnaire results overall that the experimental class has a slightly higher motivation than the control class if we look at the number of good categories and sufficient categories, where for control, the number of frequencies in sufficient and good categories is 22 or 68.75% and for the experimental class the number of frequencies in sufficient and good categories is 26 or 81.25%. But if we only look at the sufficient category, the control class has a higher motivation value than the experimental class where the control class motivation value is 8 or 25% and the experimental class motivation value is 4 or 12.5%.

Research Analysis

Prerequisite analysis test was conducted to see conclusions about the data obtained from the test results of digital class students. Before testing the hypothesis using the MANOVA test, the data normality test was first carried out.

The normality test was carried out with the help of the SPSS 16.0 for Windows program. The formula used is Kolmogorov Smirnov because the research sample is above 50 people, namely 64 students; the data from the normality test is presented as follows:

Table 4 Pre-test and Post-test Normality Test Result

	Class	Statistic	df	Sig.	Description
Learning Outcomes	Pre-Test Control	.217	32	.001	Abnormal Distribution
	Post-Test Control	.329	32	.000	Abnormal Distribution
	Pre-Test Experiment	.247	32	.000	Abnormal Distribution
	Post-Test Experiment	.190	32	.005	Abnormal Distribution

If sig. > 0.05 then the data is normally distributed. Table 4 showed that the value of Sig. the pre-test for control and experimental class were 0.001 and 0.000, respectively. Value of Sig. the post-test for the control and experimental class were 0.000 and 0.005, respectively. Based on the results obtained the value of Sig. < 0.05 it can be concluded that the pre-test and post-test learning outcomes data in both classes are not normally distributed.

Homogeneity Test

Homogeneity test was conducted to find out the two classes which used as research samples had the same variance and could represent the entire population. The homogeneity test used the Levene Statistic approach with the help of SPSS 16.0 for windows. The results of the homogeneity test of the pre-test and post-test data from the experimental and control classes are presented in Table 5:

Table 5 Pre-test and Post-test Homogeneity Test Result

Data	Levene Statistic	Sig.	Description
Pre-Test Value	8.171	.006	Inhomogeneous
Post-Test Value	6.896	.011	Inhomogeneous

If the value of Sig. > 0.05 then the data has the same variance (Homogeneous). In table 5 it showed the value of pre-test and post-test data were 0,006 and 0,011, respectively. It means the two samples groups are declared not homogeneous

Hypothesis Testing of Student Learning (MANOVA)

The hypothesis uses the MANOVA test to determine the effect of using android-based learning media on learning motivation and improving student learning outcomes. MANOVA test was using SPSS 16.0 for windows. The tested hypotheses are in the form of,

H0: : Android-Based Learning Media has no effect on motivation and increasing student learning outcomes

H1: : Android-Based Learning Media has effect on motivation and increasing student learning outcomes

The results of hypothesis testing on the data on the influence of android-based learning media using the MANOVA test are shown in the table 6.

Table 6 Output Interpretation of MANOVA Test Result Data

Effect	Value	F	Sig.	Description	
Media	Pillai's Trace	.059	1.927 ^b	.154	H ₀ Accepted
	Wilks' Lambda	.941	1.927 ^b	.154	H ₀ Accepted
	Hotelling's Trace	.063	1.927 ^b	.154	H ₀ Accepted
	Roy's Largest Root	.063	1.927 ^b	.154	H ₀ Accepted

The MANOVA test results are said to have a significant effect on the independent variable on the dependent variable if the value of Sig. four multivariate tests was < 0.05 . Based on the table of MANOVA test results, the Sig value of the four multivariate tests > 0.05 , which is 0.154. It can be said that overall android-based learning media does not have a significant effect on improving student learning outcomes and motivation.

Table 7 Output MANOVA Effects Test Value Data

Source	Dependent Variable		Mean Square	F	Sig.	Noncent. Parameter	Observed Power ^c	Description
Corrected Model	N-Gain Score	Student	.831	2.572	.114	2.572	.352	H ₀ Accepted
	Student Motivation		6.891	.911	.344	.911	.156	H ₀ Accepted

The table 7 shows the MANOVA test value, which is the result of the impact test of one independent variable, namely android-based learning media in the experimental class or not using android-based learning media in the control class on each dependent variable, namely the increase in learning outcomes and student motivation. It is said to be significant if the value of Sig < 0.05 .

Based on the results of the table above, the value of Sig. of N-Gain and motivation are 0.114 and 0.34 where > 0.05 . If the value of Sig. < 0.05 then H₁ is accepted, so there is no significant effect on the use of android-based media on student learning outcomes and motivation.

Discussion

The data processing and analysis result, it shows the use of android-based learning media doesn't have a significant effect on student learning outcomes and motivation because the value obtained by control class is higher than the experimental class. This can happen because of differences in learning activities between control and experimental class where control class students are more active in learning than the experimental class and experimental class tends to be passive in learning which this could be cause by several things, such as lack of confidence in their own answers or feeling bored and tired while studying.

Lack of self-confidence is often caused students are afraid that the answers they get are wrong. The feeling of fear they feel because students want to get recognition or praise from teachers or friends who show that they are capable. Distrust their own answers can be seen that the location of the error is in the answers their answers. Fatigue and boredom can be caused by the time the lessons are carried out, because the physics lesson in the experimental class is just

before the break (where at these hours students tend to feel tired and hungry) and after the break where students become sleepy after lunch. So that students can't focus and be passive during the learning process.

Students' accuracy also affects the student's grades when working on questions. Because the post-test questions presented are in the form of essay questions, we can see where the calculation errors are, the ability and accuracy of students in answering questions. With the implementation of the post-test in the form of an essay, it can be seen that students' mistakes when answering question number 5 were misperceptions of the concept of equation, not only a misperception when adding values into the equation, but also an error in reading the question. Another inaccuracy is small errors such as forgetting or writing the wrong answer unit so that students experience a decrease in the value of the pre-test score.

This research proved that learning media based learning was able to increase student motivation even though there isn't significant difference between the control class motivation and experimental class motivation. This is following the previous results where android based learning media can improve the student motivation even though the improving is not really high is in line with the research result conducted by Resti Yektyastuti and Jaslim Ikhan (2016) where the student learning motivation increase due to the use of Android Based Learning Media during the learning process.

But in addition, based on the results of the learning motivation questionnaire in person, it is known that as many as 8 respondents or 25% who answered learning motivation in the good category from the control class where the experimental class only had 4 respondents or 12.5% who answered learning motivation in the good category. These results support the theory that motivation affects student learning outcomes even though the results of student motivation are not as high as expected by researchers. The reason why the motivation of students in the good category is less than the sufficient category in the experimental class, returning to the process of student learning activities which are still teacher-centred and lack of confidence in their own abilities. It can be seen that there are 65% of students who answered agree on the aspect of learning independence on negative items. There is a possibility that the android media used in the experimental class is not very motivating for students because this media learning can only be used for smartphone android while many students nowadays choose to use iPhone, not Android.

Different from research result by Resti Yektyastuti & Jaslim Ikhan (2016) that android based learning media has a good potential in education to increase student learning outcome

during learning process that revealed the average student N-Gain score is 0,725 in high category for experimental class and the control class N-Gain score is 0,631 in medium category. Also the research results in Hediandah & Surjono, (2019) and Maulana et al., 2020 the experimental class N-Gain is higher than the control class N-Gain an overall it proves that the motivation of experimental class higher.

The experimental class has a higher average score than the control class. However, when viewed from the N-Gain obtained, the control class experienced a higher increase in value than the experimental class where the N-Gain score average for experimental class is 0,33 while the control class N-Gain score is 0,55 even though both are in medium category. Which mean, in this research the android based actually not really helpful to increase students learning outcomes even though it can increase student motivation. Even though they have high motivation but not with high enthusiasm and effort then all is useless and their learning outcomes will not develop significantly from previous learning outcomes.

Based on the results of data processing and analysis, it shows that the use of android-based learning media does not have a significant effect on student learning outcomes and motivation. Although the results of the post-test average of students in the experimental class were 90.16 where the post-test average of students in the control class was 88.75, not all students' scores in the experimental class had increased. There were some students who actually experienced a decrease in grades when the post-test was carried out.

The results of the student's N-Gain, motivation and MANOVA test, the results of the hypothesis obtained are Sig. > 0.05 (0.114, 0.344 > 0.05) which means H₀ accepted and H₁ is rejected. So it can be concluded that the use of android-based learning media does not have a significant effect on improving student learning outcomes and motivation for experiment class. This result is different with research result conducted by Yektyastuti & Ikhsan (2016) and Arlen et al., (2020) where the hypothesis result's obtained are Sig. < 0.05, which mean Android Based Learning Media has effect to increase student learning outcomes and motivation. But if it's seen from the post-test average score results it's in line with research result expressed by Kartini et al., (2020), because their result focused on post-test average to determine the increasing student's learning outcomes, which means Android Based Learning media has effect on student learning and motivation although it's not too significant.

Overall, Android Based Learning Media does not have a significant effect on increasing students' physics scores and motivation which is due to several factors such as the experimental

class student learning activities that are not as active as the control class, feeling bored and tired first during the learning process because of the schedule. KBM Physics after lunch break, lack of confidence in their own answers and lack of accuracy when working on post-test questions.

CONCLUSION

Based on the results of research and data analysis that has been carried out in this study, it can be concluded that the student learning outcomes in the learning process using android learning media on work and energy materials in class X MIA Islamic University Al-Ulum Integrated Medan have increased scores of 16.35. This can be seen based on the average pre-test value before being given treatment 78.81 with a standard deviation of 23.28 and the average post-test value after being given treatment is 90.16 with a standard deviation of 4.73 and the N-Gain obtained by the experimental class, that the average value The experimental class's N-Gain is 33.30% which is included in the less effective category. Thus, the use of android-based learning media is less effective for improving student learning outcomes in physics lessons on work and energy materials for class X MIA and the android-based learning media does not have a significant effect on increasing student learning outcomes and motivation. This is shown in the significant value of the MANOVA test for N-Gain data, which are 0.114 and 0.344 > 0.05.

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