

ICT Implementation in Android Applications for Entrepreneurship Learning: A High School Case Study in Jakarta

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This study examines the effect of ICT implementation on the quality of learning among students in a high school located in Jakarta, Indonesia. Using questionnaire surveys, this study shows that effective learning has a positive impact on the quality of learning of students in using the quality of learning. This study also shows that interactive learning has a positive impact on the quality of learning among the students. In addition, this study shows that creative learning has a positive impact on the quality of learning among the students. The findings in this study highlights the benefits on entrepreneurship knowledge through an Android-based learning process as a new learning process approach to digital technology. The learning process with new technology can increase student interest in the field of entrepreneurship and increase student learning intentions as well as support a more independent and more creative learning process. This study contributes to the improvement and development of ICT-based learning systems strategies in the class so that the system becomes more efficient, active, creative, dynamic, independent, and faster at the level of secondary and vocational schools.

Key words: *ICT-based learning system, android application, entrepreneurship learning, quality of learning, creative learning.*



Introduction

Due to the advancement of information technology and computerization in this digital era, ICT-based, or information-and-communication-technology-based, education is important and has a positive impact on the progress of educational programs (Zhao, 2013). ICT is useful to access information and knowledge from various sources connected to communication networks. Additionally, ICT also helps the education field, especially for managing education information effectively and efficiently (Ahmadi, 2018). The management of education has an impact on improving the quality of the education process. With a good-quality education process, it is expected that education will generate graduates who are qualified, competent, experts in the field of science and technology (Sabzian, Pourhossein & Sodouri, 2013). In order to meet this expectation, some schools in West Jakarta have introduced Android with the basis of app Inventor.

This study aims to examine whether effective ICT-based Learning Media enhances the quality of learning. In addition, this study examines whether interactive ICT-based Learning Media improves the quality of learning. Finally, this study examines whether creative ICT-based Learning Media improves the quality of learning. The next section provides a literature review. This is followed by an explanation of the research method. Finally, the results and discussion are provided before the last section which concludes this study.

Literature Review

Information and communication technology, or ICT, is a device of technology used in processing, compilation, storage, and manipulation of data in various ways to process and deliver good-quality information. In the business field, ICT has been widely used to support business processes in companies, including the economic and banking sectors by providing e-business, e-commerce, e-banking and other applications and services. The need for time and cost efficiency causes every business person to feel the need to implement information technology in running their business. The application of Information and Communication Technology causes changes in work habits, for example, the application of Enterprise Resource Planning (ERP) (Wu & Liu, 2013).

Android is a Linux-based operating system for cellular phones, such as smartphones and tablet computers. Android provides an open platform for developers to create their own applications for use in various mobile devices. Initially, Google Inc. acquired Android Inc., a new corporation which develops software for cell phones. The utilization of ICT in learning PAI is by using power point media and digital teaching materials. PAI learning media, with topics of ethics and moral aspects using PowerPoint, is designed based on the educational learning unit of PAI for students majoring in economics by paying attention to the value of competency

standards. The design of digital teaching materials employs SOM (Screencast-O-Matic) application, which is very interactive. Learning ethics and moral aspects using PowerPoints and digital teaching materials has a positive impact on student learning motivation (Ghani & Muhammad, 2016; Ahmadi, 2018).

Information technology has long been assisting in accounting processes in companies and organizations. The main reason for using IT in accounting is to attain efficiency and save time and cost. Other reasons include increasing the effectiveness and obtaining correct results/output of financial statements. Additional reasons include protecting company assets. If it is illustrated using organizational pyramids, accounting tasks are at the lowest level, known as the operational and transactional level. This level handles accounting of inter alia, purchasing transactions, sales, shipping, payment transactions, receipt of sales proceeds, and preparation of reports. It has characteristics that are technical, repetitive, procedural, standard, and boring. These characteristics are the main reasons why information technology is so closely related to accounting. In fact, this relation has been consistent for a long time: since the era of mainframes, computers that were large and energy wasting.

The competitiveness of companies can be improved, and other business opportunities can be obtained by utilizing ICT (Raihan & Lock, 2010). Utilizing ICT does not only mean using the internet as a tool for promotion, but it also means balancing the utilization with good administrative management through the use of appropriate software. The development of websites as promotion and marketing media increases sales volume, and ultimately, increases revenue. This increase in income can later expand a company (Hassan, Ghani & Said, 2009; Jauhari, 2012). Websites are a number of web pages that have interrelated topics, sometimes complemented by images or other types of files. A website is usually placed at least on a web server that can be accessed via networks, such as internet or local area network (LAN), using internet addresses that are known as uniform resource locator (URL). The combination of all sites that can be accessed publicly on the internet is known as World Wide Web, which is commonly abbreviated to www.

Procedures include schedules and methods for delivering information, providing material for practice, study, testing, determination of levels, and so on. The teaching system is always characterized by the organization and the interaction between components to educate students. The available applications have their respective uses to make an Android gadget have many benefits, or be multifunctional, especially if the application can support daily activities (Ghani & Muhammad, 2019).

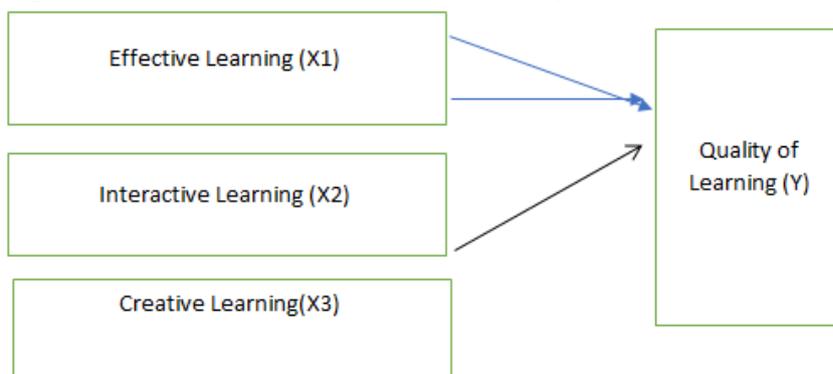
One of the negative impacts of the utilization of Android as learning media is that teachers may tend to become less creative, because learning media that can help the learning process have been provided. What to do now is to overcome this negative impact as not to inhibit the

learning process. The discussion here will be about how to overcome the negative impact of Android as learning media. The focus of the teacher is teaching and transferring competencies. The focus is mainly on the teaching results for students in order to obtain a potential from the lesson plan outlined according to the curriculum (Dawson, Cavanagh & Ritshaupt, 2008; Ghani, Said & Muhammad, 2012). The focus is to make students willing to learn and skilled. In addition, in terms of teachers, the process of teaching can be observed indirectly.

Research Framework and Hypotheses

Figure 1 presents the research framework of this study. The dependent variable of this study was the quality of learning, in the context of the utilization of Android applications. This can add value of knowledge and sale to entrepreneurship learning in high schools in both science and social studies. Additionally, the independent variables in this study are taken from the concept of the Technology Acceptance Model (TAM). The variables are used as references to the interest in using an Android application among high school/vocational students are effective learning (X1). This variable is expected to have a positive impact on student perceptions that the utilization of Android learning system has benefits in the teaching and learning process in schools. The interactive learning (X2). This variable is expected to have a positive impact on student perception that the utilization of the Android learning system is easy to understand. In addition, creative learning (X3). This variable affects the perception of learning of a student in utilizing an easy-to-understand Android learning system

Figure 1. Research Framework of this study



Subsequently, three research hypotheses were developed in this study. The hypotheses were used to determine whether theoretical answers in the hypothesis statement are supported by facts obtained and analyzed in the process of data testing (Nur & Supomo: 1999). The three hypotheses are:

H1: Effective ICT-based learning media improves the quality of learning among the students.

H2: Interactive ICT-based learning media improves the quality of learning among the students

H3: Creative ICT-based learning media improves the quality of learning among the students.

Research Methods

The population of this study was high school and/or vocational school students of the 11th and 12th grade from A- accredited science and social studies majors in the region of West Jakarta. The number of populations in this study was difficult to determine because the number changes each semester due to school dropouts or school transfers.

The questionnaire survey was used as the research instrument of this study. The questionnaire employed a Likert scale. A Likert scale is the most widely used method for measuring positive or negative responses to a question. There are four sections in the questionnaire. Section A requests the respondents to provide responses on the effectiveness of ICT implementation. This is followed by Section B that provides questions in relation to integrated ICT. Section C requests the respondents to provide their response on creative ICT implementation. Finally, in Section D respondents are asked to provide the level of their quality of learning.

The questionnaires were distributed directly to the 11th and 12th grade students in A-accredited private schools in West Jakarta. This study was conducted over a period of one year.

Result and Discussion

Validity and Reliability Testing

The first step in the analysis and discussion of the primary data obtained from the questionnaire was to test the validity and reliability of the research instrument (Ghazali, 2018). Validity testing ensures that the instruments used in a research process are correct in measuring what is measured.

Table 1: Result of Validity Testing of Effective Learning Variable

Item	Pearson Value	R Value	Conclusion
	Correlation (a=5%, df =249)		
A1	1	0,1041	valid
A2	0,511	0,1041	valid
A3	0,392	0,1041	valid
A4	0,251	0,1041	valid
A5	0,323	0,1041	valid
A6	0,330	0,1041	valid
A7	0,226	0,1041	valid
A8	0,86	0,1041	valid
A9	0,244	0,1041	valid

In general, there are two formulas or methods, namely, Bivariate (Pearson) correlation and Correlated Item-Total Correlation. Table 1 shows that each statement on effective learning is valid. It is considered to be valid because the Pearson value was more than the $r_{table} \alpha = 5\%$, $df = n-2$, where $df = 249$. Item A1 (effective learning) had a Pearson value of 1 while the r_{table} value is 0.1041, resulting in $1 > 0.1041$. Thus, effective learning statements are considered to be valid.

Table 2 shows that each statement on interactive learning is valid. It is valid because Pearson correlation value was more than the $r_{table} \alpha = 5\%$, $df = n-2$, where $df = 249$. Item B1 (interactive learning) had a Pearson correlation value of 0.67 while the r_{table} value was 0.1041, resulting in $0.299 > 0.1041$. Thus, interactive learning statements are valid.

Table 2: Result of Validity Test of Interactive Learning

Item	Pearson Value Correlation	R Value ($\alpha=5\%$, $df=249$)	Conclusion
B1	,299	0,1041	valid
B2	,236	0,1041	valid
B3	,302	0,1041	valid
B4	,507	0,1041	valid
B5	,103	0,1041	valid
B6	,330	0,1041	valid
B7	,135	0,1041	valid
B8	,040	0,1041	valid
B9	,351	0,1041	valid

Table 3 shows that each statement on creative learning is valid. It is valid because Pearson correlation value was more than the $r_{table} \alpha = 5\%$, $df = n-2$, where $df = 249$. Item C1 (creative learning) had a Pearson correlation value of 0.67 while the r_{table} value was 0.1041, resulting in $0.67 > 0.1041$. Thus, interactive learning statements are valid.

Table 3: Results of Validity Test of Creative Learning

Item	Pearson Value Correlation	R Value ($\alpha=5\%$, $df=249$)	Conclusion
C1	.67	0.1041	valid
C2	,220	0,1041	valid
C3	.005	0,1041	valid
C4	.150	0,1041	valid
C5	.176	0,1041	valid

Table 4 provides the results on each statement on learning quality. Table 4 shows that the statements are valid because the Pearson correlation value was more than the $r_{table} \alpha = 5\%$, $df = n-2$, where $df = 251-2$. Item D1 (quality of learning) had a Pearson correlation value of 0.172 while the r_{table} value was 0.1041, resulting in $0.172 > 0.1041$. Thus, quality learning statements are valid.

Table 4: Result of Validity Testing of Learning Quality

Conclusion	Item	Pearson Values Correlation	R Value ($\alpha=5\%$, $df=249$)
D1	,172	0,1041	valid
D2	,189	0,1041	valid
D3	,189	0,1041	valid
D4	,198	0,1041	valid
D5	,132	0,1041	valid

After testing the validity of the research instruments, reliability testing was conducted. Reliability testing aims to determine to which extent the data collected in this study are valid and reliable. In this study, the measuring instrument was a questionnaire. The value for determining the reliability of an instrument is the value of Cronbach's Alpha. If the value is more than 0.759, then the variables that were used as questions in this study are reliable. Table 5 presents the results that all the variables in this study are reliable.

Table 5: Result of Reliability Testing of Research Variables

Variable	Cronbach's Alpha	Question Item	Conclusion
Effective Learning (A)	,759	9	reliable
Interactive Learning (B)	,800	9	reliable
Creative Learning (C)	,838	5	reliable
Quality of Learning (D)	,821	5	reliable

Descriptive Statistics

Table 6 presents the response of the respondents on effective learning. Effective learning in this discussion is an effort of the teacher or lecturer in doing their duties, which are expected to produce useful and purposeful learning by using right procedures. Table 6 shows that the respondents' responses to A1 question items stating, "effective learning", as many as 89 respondents, or 35.6%, stated 'strongly agree'. Those who stated 'agree' were 136

respondents, or 54.4%. Respondents who stated 'disagree' were 24 respondents, or 9.6%. There were no respondents who stated 'strongly disagree' to the A1 question items. This indicated that most respondents agree that the utilization of effective learning system improves the quality of students in schools during the teaching and learning process.

Table 6: Response of Respondents to Effective Learning Variable

Item	Strongly Agree		Agree		Less Agree		Disagree	
	F	%	F	%	F	%	F	%
A1	89	35,6	136	54,4	24	9,6	0	,4
A2	61	24,4	156	62,4	33	13,2	1	,4
A3	103	41,4	126	50,4	20	8,0	1	,4
A4	102	40,8	116	46,4	30	12	8	,8
A5	70	28	147	58,8	31	12,4	2	,8
A6	47	18,8	169	67,6	34	13,6	1	,8
A7	82	32,8	134	53,6	30	12	4	1,6
A8	75	30	128	51,2	43	17,2	43	17,2
A9	71	28,4	133	53,2	42	16,8	4	1,6

Table 7 presents the descriptive statistics on interactive learning. Based on the table of respondents' responses to B1 question item which states "interactive learning", as many as 119 respondents or 47.6% stated 'strongly agree', 102 respondents or 40.8% stated 'agree', 25 respondents or 10% stated 'disagree', and 4 respondents or 1.6% stated 'strongly disagree'. This result indicates that most respondents strongly agree that interactive learning has many benefits and improves the quality of students in schools during the teaching and learning process.

Table 7: Response of Respondents to Interactive Learning Variable

Item	Strongly Agree		Agree		Less Agree		Disagree	
	F	%	F	%	F	%	F	%
B1	119	47,6	102	40,8	25	10	4	1,6
B2	103	41,2	117	46,8	26	10,4	4	1,6
B3	116	46,4	117	46,8	15	6	4	1,6
B4	30	12	138	55,2	73	29,2	9	3,6
B5	32	12,8	149	59,6	62	24,8	7	2,8
B6	68	27,2	139	55,6	35	14	8	3,2
B7	116	46,4	107	42,8	22	8,8	5	2
B8	57	22,8	118	47,2	65	26	10	4
B9	86	34,4	138	55,2	20	8	6	2,4

Table 8 presents the respondents' responses to C1 question item which states "creative learning", as many as 49 respondents, or 19.6%, stated 'strongly agree'. Whereas 109 respondents, or 43.6%, stated 'agree', 76 respondents or 34% stated 'disagree', and 16 respondents or 6.4% stated 'strongly disagree'. This indicates that most respondents agree that creative learning has many benefits and improves the quality of students in the teaching and learning process.

Table 8: Response of Respondents to Creative Learning Variable

Item	Strongly Agree		Agree		Less Agree		Disagree	
	F	%	F	%	F	%	F	%
C1	49	19,6	109	43,6	76	30,4	16	6,4
C2	86	34,4	115	46	36	14,4	13	5,2
C3	36	14,4	114	45,6	74	29,6	26	10,4
C4	69	27,6	128	51,2	42	16,8	11	4,4
C5	86	34,4	132	52,8	25	10	7	2,8

Table 9 presents the respondents' responses to C1 question item which states "learning quality", as many as 85 respondents, or 34%, stated 'strongly agree',. However, 86 respondents, or 35.2%, stated 'agree', 36 respondents or 14.4% stated 'disagree', and 69 respondents or 27.6% stated 'strongly disagree'. This indicates that most respondents agree that learning quality has improved.

Table 9: Respondents' Responses to Learning Quality variable

Item	Strongly Agree		Agree		Less Agree		Disagree	
	F	%	F	%	F	%	F	%
D1	85	34	125	50	32	12,8	8	3,2
D2	86	35,2	115	46	36	14,4	13	5,2
D3	36	14,4	114	45,6	74	29,2	26	10,4
D4	69	27,6	128	51,2	42	16,8	11	4,4
D5	86	34,4	132	52,8	25	10	7	2,8

Classical Assumption Test

The classical assumption test is to assess whether there are classical assumption problems in the linear regression model of the Ordinary Least Square (OLS). In the regression method, there are usually a number of problems. Therefore, to detect whether there was a regression problem in this study or not, the classical assumption test was conducted. This includes:

normality test, heteroscedasticity testing, and multicollinearity testing. Table 10 presents the results of the normality test using Kolmogorov-Smirnov and Shapiro-Wilk.

Table 10: Normality Test

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Unstandardized residual	,145	250	,000	,950	250	,061

a. Lilliefors Significance Correction

To support the test above, the normality test will then be employed with plot diagram obtained by Q-Q plot method which is shown in Figure 2.

Figure 10: Normality Test using Q-Q Plot

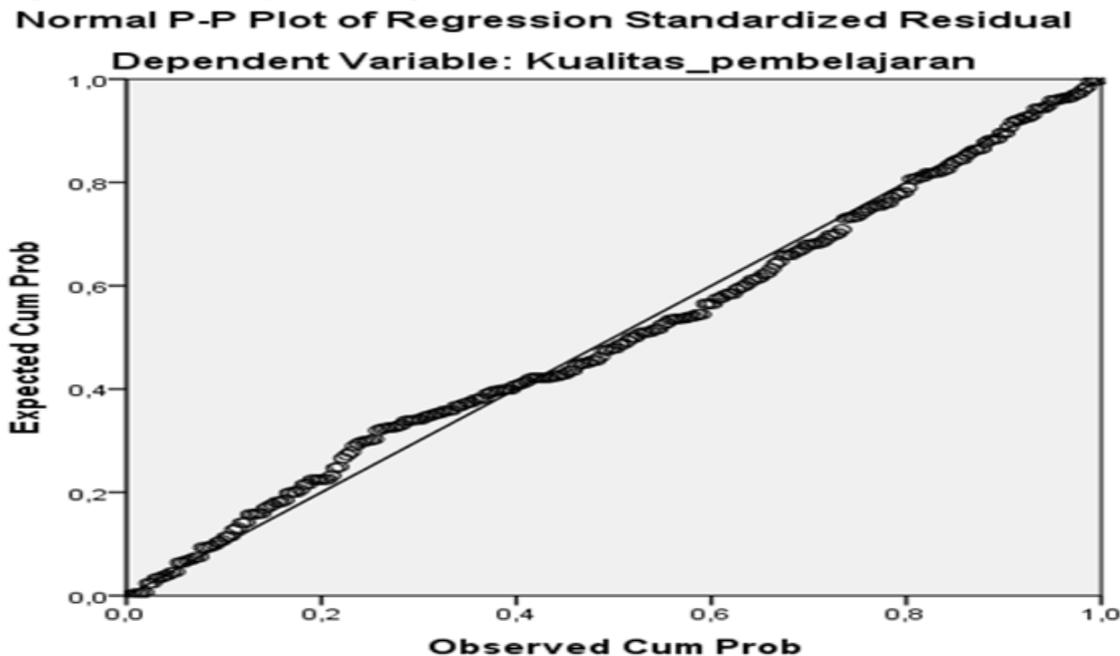


Figure 2: Normality

Test This study tested heteroscedasticity using Park test method. Heteroscedasticity can be determined from coefficient table. If the significance value (probability) of the independent variables is below 0.05, then there is heteroscedasticity. However, if the significance value is more than 0.05, there is no heteroscedasticity. Based on the results shown in Table 11, it can be seen that the significance or Sig of effective learning variable, interactive learning variable, and creative learning variable were all more than 0.05. This means there was no heteroscedasticity.

Table 11: Heteroscedastity Test Using Park Test Method

Model		Coefficients ^a				
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,141	1,149		,993	,321
	Effective learning	,132	,042	,159	3,139	,002
	Interactive learning	,083	,037	,115	2,225	,027
	Creative learning	,562	,042	,614	13,230	,000

a. Dependent Variable: quality of learning

Several multicollinearity test methods were employed in this study. If tolerance value is more than 0.1 and Variance Inflation Factor (VIF) has a value of less than 10, it can be said that there is no correlation between independent variables. The results are shown in Table 12. Based on the results of the multicollinearity test on the table, it can be concluded that the tolerance value of each independent variable in this study was more than 0.1. Similarly, the VIF value of the three independent variables was less than 10. These results mean that among the independent variables in this study, there was no correlation. In other words, there were no multicollinearities among the independent variables.

Table 12: Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	Effective learning	,738	1,354
	Interactive learning	,713	1,402
	Creative learning	,883	1,133

Dependent variable: quality of learning

In this study, the Coefficient of determination was used to determine the influence of the independent variable on the dependent variable. The value of R^2 is between zero and one. If the value of R^2 approaches 1, the greater the influence of the independent variable on the dependent variable. The results are shown in Table 13.

Table 13: Result of Coefficient of Determination (R^2)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,729 ^a	,532	,526	1,983
a. Predictors: (Constant), creative learning, effective learning, interactive learning				

Table 14 presents the results of t-test that aims to determine whether the independent variables, which are effective learning, interactive learning, and creative learning, have a positive and significant impact on the dependent variable, namely the quality of learning. Table 14 shows the value of t-calculated (t_{calc}) of effective learning variable (X1) was more than the value of t, in which $3.139 > 1.9697$ with a significant level below 0.05, which was 0.000, thus, $t_{calc} > t_{table}$. It can be said that the variable X1 had a contribution to Y. The positive value of t indicates that the variable X1 had a relation with Y. Therefore, creative learning had a significant impact on the quality of learning.

The value of t_{calc} of interactive learning variable (X2) was more than the value of t_{table} , in which $2.225 > 1.9697$ with a significant level below 0.05, which was 0.027. Therefore, $t_{calc} > t_{table}$, which means that X2 had a contribution to Y. The Positive value of t indicated that variable X2 had a relation with Y. Thus, it can be concluded that interactive learning had a significant influence on the quality of learning. The value of t-calculated of creative learning variable (X3) was more than the value of t-table, in which $13,230 > 1,9697$ with a significant level below 0.05, which was 0,000. So, $t_{calc} > t_{table}$. This means that the variable X3 had a relation that was in line with Y. It can be said that creative learning had a significant influence on the quality of learning.

Table 14: Result of T-Test

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,141	1,149		,993	,321
	Effective learning	,132	,042	,159	3,139	,002
	Interactive learning	,083	,037	,115	2,225	,027
	Creative learning	,562	,042	,614	13,230	,000
a. Dependent Variable: quality of learning						

Conclusion

This study examines the effect of ICT implementation on the quality of learning among students in a high school located in Jakarta, Indonesia. Using questionnaire survey, this study shows that effective learning has a positive impact on the quality of learning of students in using the quality of learning. This study also shows that interactive learning has a positive impact on the quality of learning among the students. In addition, this study shows that creative learning has a positive impact on the quality of learning among the students.

The findings in this study are expected to provide benefits to several parties particularly as a basis for educational institutions in developing entrepreneurship material for students. This study also can assist in planning educational institutions to maximize the use of ICT-based learning media in entrepreneurship subjects (in the teaching and learning process). Finally, the findings in this study provides improvement on the university's strategy in improving students' understanding of knowledge.

Based on the conclusions and limitations mentioned previously, recommendations that can be given for further research include the research data being extended to data from higher education institutions. This should include higher education institutions which offer study programs of mobile programming, in order to find out the implementation of ICT in Android applications with expanded methods, such as the Inventor app method and other methods that are more broad and progressive. The period of research should be extended so that research results will be more varied and accurate, and future research is expected to be able to use more widespread variables, along with the rapid development of Android nowadays, and to expand employment opportunities.

In summary, this study shows that effective learning has a positive impact on the quality of learning of students in using the quality of learning. Interactive learning has a positive impact on the quality of learning of students in using the quality of learning. Creative learning has a positive impact on the quality of learning of students in using the quality of learning. This study implicates that the quality learning can be increase the effort of effective learning, interactive learning and creative learning improved.

It is recommended that high schools provide more ICT- based learning in order to improve interactive learning using technology, using the mobile telephone device to learn in class and encourage the students with ICT.



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