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The Effect of Digital Literacy-based Computer Supported Collaborative Learning (CSCL) Model on Students' History Learning Outcomes

Vivi Sandra Mauritania[1], Nurul Umamah[2*], Marjono[3]

Department of History Education, Faculty of Teacher Training and Education,
University of Jember, Indonesia
Jl. Kalimantan 37, Jember 68121
nurul70@unej.ac.id

Abstract: *Merdeka Belajar curriculum is a new curriculum designed by optimising content so that students are able to explore concepts and strengthen students' learning competencies, especially in learning history. Based on previous research, it shows the low learning outcomes of students in history subjects. Theoretical studies show the application of collaborative learning models can improve student learning outcomes. In theory, one of the collaborative learning models that can improve student learning outcomes is the Digital Literacy-based Computer Supported Collaborative Learning (CSCL) learning model. The purpose of this study was to examine the effect of CSCL model based on digital literacy on students' learning outcomes in history subjects. This research uses a quantitative approach with a Quasi Experimental research design; pretest-posttest; nonequivalent group design. The data analysis technique used was the ANACOVA test. The ANACOVA test results showed a sig value. 0.000 < 0.05 which indicates a significant effect of the application of the digital literacy-based CSCL model on learning outcomes and a partial eta squared value of 0.110 and his included in the moderate category. In conclusion, there is a significant effect on learning outcomes by applying the CSCL model based on digital literacy in history subjects.*

Keywords— Collaborative learning, Computer Supported Collaborative Learning (CSCL), Digital Literacy

1. INTRODUCTION

The rapid development of science and technology in the 21st century has brought a new paradigm shift in education, connecting the digital and physical worlds through technological advances (ICT) and IoS (Internet of Services) [1, 2, 8, 18]. The development of increasingly sophisticated information technology plays an important role in various aspects of human life today. Advances in information technology open up new opportunities in the world of education to improve the quality of the teaching and learning process. [21]. The emergence of new ideas in the field of science and technology facilitates the acquisition of learner knowledge [1]. Properly applied IT utilisation can enable learners to learn according to their individual capacity and can help learners develop digital skills, and can be used to improve teaching and learning.

The development of technology has caused the Millennial generation (Generation Z) to become accustomed to interacting and communicating in a world that is always connected. Even today's millennials tend to prefer a variety of information presented in the form of virtual content or interaction. This can provide a collaborative experience with clear objectives and can increase learners' motivation to learn [19]. IT-based learning can also create new opportunities within the scope of education, such as pedagogical self-realisation, collaborative learning, and democratisation of study in general [5]. Learners as Gen Z are required to be able to have a variety of competencies that have been adjusted to increase individual capacity, such as creativity, collaboration, communication, and critical thinking (4C) [2], which are supported by digital skills (skills to do information literacy, media literacy, and literacy related to ICT) [15, 17], this shows that 4C skills are in accordance with the implementation of the current independent curriculum, which aims to create an innovative technology-based learning process according to the needs of learners [12]. Through this independent curriculum, learners as the millennial generation are expected to be able to understand learning materials well and have skills in utilising digital technology well.

The independent learning curriculum is a fairly diverse intracurricular learning, by optimising content so that students are able to explore concepts and strengthen competencies [13], and emphasises the concept of freedom of thought, especially freedom of learning for educators and students, in the current 4.0 era [26]. The implementation of the unique Merdeka curriculum by utilising technology for learning has become a challenge for educators. Over time, educators must also develop innovative skills to utilise technology as a tool that can facilitate learning activities efficiently and effectively, so as to meet the learning needs of learners, especially in this digital age [11]. The utilisation of technology in learning activities helps improve learners' ability to innovate so that learning becomes meaningful [25]. This shows that technology can facilitate learning activities by presenting various information needed and guiding learners' cognitive processes during learning [8]. One of the technology-based learning models that facilitate learners to collaborate and expand their cognitive knowledge is through the use of computer-assisted

collaborative learning (CSCL) models based on digital literacy.

The CSCL learning model encourages social interaction and co-construction of knowledge when completing tasks. This model combines the concepts of collaboration and computer-assisted learning [24], allowing students to convey knowledge information and express ideas and opinions. and discuss with each other. online forum [19]. Online discussion activities as a collaborative learning model are currently rife in education [19]. Collaborative discussions conducted online require students to actively participate in ongoing dialogue around shared concepts and ideas with the aim of building collective knowledge. In addition, the CSCL model also encourages the development of students' logical thinking [3, 20]. Since the CSCL model can significantly improve students' logical thinking, it also has an impact on improving students' learning outcomes. Therefore, CSCL makes an important contribution to the effectiveness of collaborative learning.

From what we have discussed so far, we can see that the utilisation of technology plays a very important role in education. Technology provides students with easy access to a variety of learning information and opportunities to practice what they have learnt. Optimisation of technology in schools especially in history education affects the level of historical awareness and improves students' understanding of historical materials. Therefore, it is necessary to conduct an experimental research on the implementation of collaborative learning with CSCL model based on digital literacy. This is then integrated with the utilisation of technology to increase students' level of historical awareness and encourage the success of history learning in schools.

2. METHODOLOGY

2.1 Research Design

This research in it uses a quantitative approach with the research design used is Quasi Experimental Design. Pretest posttest non equivalent group design [4, 5].

2.2 Determine Population and Sample

The population used was 252 students from class XI IPA 1 to XI IPA 7 at SMAN Balung. The sample used in this study was 72 students. The sampling technique used by conducting a homogeneity test to see whether the population variants in the study are the same or not. As for the determination of the control group and the experimental group in the study using the average results and standard deviation of the daily test in history subjects.

Table 1: Homogeneity test results

Homogeneity Test

	Levene Statistic	df1	df2	Sig.
UH	0.961	6	245	0.452

Based on the results of the homogeneity of variance test, a value of 0.452 was obtained (0.452 > 0.05) which means it is very significantly different, so this indicates that the achievement of UH learning outcomes from classes XI IPA 1, XI IPA 2, XI IPA 3, XI IPA 4, XI IPA 5, XI IPA 6, and XI IPA 7 is homogeneous (relatively the same), so thus the requirements of homogeneity of variance have been met. Furthermore, to determine the sample can be done by using the results of the calculation of the average daily test results from each class XI IPA as follows.

Table 2: Mean and Standard Deviation of Daily Test of XI IPA class

Mean and Standard Deviation

CLASS	Mean	Std. Deviation	N
XI IPA 1	81.2500	6.89254	36
XI IPA 2	82.3611	6.54284	36
XI IPA 3	81.1111	6.24627	36
XI IPA 4	81.1667	5.84808	36
XI IPA 5	82.0278	6.53556	36
XI IPA 6	81.6389	7.07976	36
XI IPA 7	82.1944	5.33891	36
Total	81.3929	6.46107	252

Based on the results of the average daily test scores above, XI IPA 5 class was selected as the control class (without treatment) using the discovery learning model, and XI IPA 7 class as the experimental class (with treatment) using the CSCL model based on digital literacy.

2.3 Research Instruments

The instrument used in measuring the cognitive ability of students' learning outcomes is using a multiple choice test that has been adjusted to the cognitive domain indicators in C4 (analysis). The test instrument has previously been tested for validity and reliability. The validity test is carried out using the product moment correlation formula to calculate the analysis of the relationship between the items and the total score. The reliability test was carried out using the Cronbach Alpha formula. Calculations for validity and reliability tests were carried out using SPSS 25 for windows software. The data analysis used is the Anacova test using SPSS 25 for windows software. Before conducting the Anacova test, there are several prerequisite analysis tests that must be carried out, including: normality test, homogeneity test, and linearity test. If the prerequisite tests have been met, then hypothesis testing can be carried out.

3. RESULT AND DISCUSSION

3.1 Result

A. Instrument Testing

- **Validity Test**

The validity test is carried out to measure whether the research instrument that will be used is valid or not, so that if the research instrument is declared valid then this shows that the measuring instrument used to obtain data is also valid. After testing the instrument, then the data that has been collected will be calculated the level of validity using the product moment correlation formula assisted by SPSS 25 for windows software in calculating the analysis of the relationship between the question items and the total score. Initial data from the validity test results conducted on both pretest and posttest instruments totalled 25 items in the form of multiple choice questions with the cognitive level used C4 (analyse). Based on the results of the validity test conducted on all pretest and posttest items, it shows that the value of r_{count} is greater than r_{table} , with significance at a level smaller than 0.05 or equivalent to 5% which indicates that the value is significant. So it can be decided that all question items are declared valid and suitable for use as instruments in research.

- **Reliability Test**

The reliability test aims to measure the consistency of something, even if it is repeated many times on the same object. In this study, the instrument reliability test was calculated using the Cronbach Alpha Technique through SPSS 25 for windows software. The standard reliability coefficient category used is Gulford's opinion [10] as follows:

a. 0.80<r11≤1.00 Very high reliability
b. 0.60<r11≤0.80 High reliability
c. 0.40<r11≤0.60 Medium reliability
d. 0.20<r11≤0.40 Low reliability
e. -1.00<r11≤0.20 Very low reliability

Table 3: Reliability Test of Learning Outcomes Instrument

Reliability Test

Variables	N	Koefisien (Cronbach's)	Description
Learning outcomes	36	0,779	High reliability

Based on the learning outcomes instrument reliability test table using the Cronbach Alpha Technique, the coefficient value is 0.779 which is in the category 0.60<r11≤0.80 (high reliability). So it can be decided that the test instrument to measure learning outcomes has a good level of consistency.

B. Prerequisite Test Analysis

- **Normality Test**

The normality test aims to determine whether the data is normally distributed. The formula used to calculate the normality test is Kolmogrov Smirnov on SPSS version 25 for windows.

Table 4: Normality Test Results

Normality Test

Class		Kolmogorov-Smirnova		
		Statistic	df	Sig.
Learning Outcomes	Experiment Pretest	0.122	36	0.197
	Experiment Posttest	0.145	36	0.054
	Control Pretest	0.125	36	0.171
	Control Posttest	0.140	36	0.072

Based on the normality test results, the experimental class obtained a pretest significance value of 0.197 (0.197 > 0.05) and a posttest significance value of 0.054 (0.054 > 0.05). As for the control class, the pretest significance value was 0,171 (0.171 > 0.05) and the posttest significance value was 0.072 (0.072 > 0.05). Thus the overall significance value of learning outcomes in the experimental class and control class both show a significance value above 0.05. So it can be decided that the pretest and posttest data in both classes are normally distributed.

- **Regression Homogeneity Test**

Regression homogeneity test is used in order to determine whether there is the same variance between covariates and independent variables. Regression homogeneity testing is done using the F test with a significance level of 0.05 contained in SPSS version 25 for windows. The slope of the regression line can be declared homogeneous if there is an interaction between the covariate and the independent variable with a significant value of more than 0.05.

Table 5: Regression Homogeneity Test Results

Regression Homogeneity Test

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Kelas Pretest	*	7.646	1	7.646	0.794	0.376

Based on the results of the regression homogeneity test that has been carried out, it shows a significance value of 0.376 (0.376 > 0.05). Thus it can be decided that the results of the regression homogeneity test on student learning outcomes are greater than the significance level of 0.05 so that the assumption of homogeneity has been fulfilled.

- **Linearity Test**

The linearity test aims to determine whether there is a linear relationship between covariates and dependent variables. Decision making on the linearity test is as follows:

a. If the significance value is more than 0.05, there is no linear relationship between the covariates and the dependent variable.
b. If the significance value is less than 0.05, there is a significant linear relationship between the covariates and the dependent variable.

Table 6: Linearity Test Results

Linearity Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Pretest	46.689	1	46.689	4.847	0.031

Based on the results of the linearity test that has been carried out, it shows a significance value of 0.031 (0.031 < 0.05). Thus it can be decided that the linearity test results are smaller than 0.05, so that the assumption for regression linearity has been fulfilled. Through the results of the linearity test, the pretest variable has a strong enough reason as a covariate.

- **Hypothesis Test**

Hypothesis testing was carried out in order to answer the problem formulation presented in the study. The research data from the control and experimental classes will then be tested using the ANACOVA (analysis of covariance) test using SPSS for 25 windows software.

Table 7: Anacova Test Results

ANACOVA Test

Dependent Variable: Posttest Learning Outcomes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	363.175[a]	3	121.058	13.096	0.000	0.366
Intercept	734.422	1	734.422	79.447	0.000	0.539
Model Learning	88.198	1	88.198	9.541	0.003	0.123
PretestHB	19.595	1	19.595	2.120	0.150	0.030
Model_Learning * PretestHB	77.767	1	77.767	8.413	0.005	0.110
Error	628.603	68	9.244			
Total	503662.000	72				
Corrected Total	991.778	71				

a. R Squared = .366 (Adjusted R Squared = .338)

Based on the results of the ANACOVA test that has been carried out, the corrected model column shows that the significance value is 0.000 (0.000 < 0.05), so that simultaneously the CSCL learning model based on digital literacy has an influence on student learning outcomes. The results of the average value of students' cognitive knowledge at the time of the posttest were higher than the average value at the time of the pretest. Learners in the experimental class tended to have high performance in historical knowledge after the action was taken by applying the CSCL model based on digital literacy. Furthermore, the results listed in the learning model column show a significance value of 0.005 (0.005 < 0.05), so it can be decided that there is a significant effect of the application of the digital literacy-based Computer Supported Collaborative Learning (CSCL) model on student learning outcomes in history subjects. The magnitude of the effect of the learning model on student learning outcomes can be seen from the partial eta squared column with a value of 0.110 and is included in the moderate category . The criteria for the amount of influence itself can be seen in the effect size criteria table presented as follows:

Table 8: Effect Size Criteria

Effect Size

Value	Effect Size
0.01	Small Effect
0.06	Moderate Effect
0.14	Large Effect

The tests carried out to see the effect between the two models applied in the control and experimental classes, namely the Computer Supported Collaborative Learning (CSCL) model based on the digital literacy of the Discovery Learning model, can be seen in the table of estimated marginal means results as follows:

Tabel 9: Estimates Marginal Means

Estimates Marginal Means

Dependent Variable: Posttest Learning Outcomes

Model_Learning	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Control Class (Discovery Learning)	82.491[a]	0.567	81.360	83.622
Experiment Class (Digital Literacy CSCL)	85.718[a]	0.579	84.562	86.874

a. Covariates appearing in the model are evaluated at the following values: Pretest Hasil Belajar = 75.97.

Based on the output of the results of estimates marginal means, it shows that the results of estimates marginal means in the control class with a mean value of 82.491 by applying

the Discovery Learning model using a scientific approach. As for the experimental class, it has a mean value of 85.718 by applying the Computer Supported Collaborative Learning model based on digital literacy. Thus it can be concluded that the CSCL model based on digital literacy has more effect on student learning outcomes than the Discovery Learning model.

3.2 Discussion

This research was conducted in order to examine the effect of CSCL learning model based on digital literacy on students' learning outcomes in history subjects. This study used two groups, namely the experimental group that was given treatment by applying the CSCL learning model based on digital literacy, and the control group by applying the discovery learning model. Researchers verified whether there was a significant effect of using the CSCL model based on digital literacy on student learning outcomes in history subjects. The data analysis used was ANACOVA test with pretest as the covariate.

Based on the ANACOVA test results contained in table 7 in the corrected model column which shows a significance value of 0.000 (0.000 < 0.05), so that simultaneously the pretest and learning model have an influence on student learning outcomes. Furthermore, the results listed in the learning model column show a significance value of 0.005 (0.005 < 0.05), so it can be decided that H0 is rejected and Ha is accepted, so the conclusion is that there is a significant effect of the application of the digital literacy-based Computer Supported Collaborative Learning (CSCL) model on student learning outcomes in history subjects. The magnitude of the effect of the learning model on student learning outcomes can be seen from the partial eta squared column with a value of 0.110 and is included in the moderate effect category. Based on the table of estimated marginal means, the mean value in the control class is 82.491 by applying the Discovery Learning model using a scientific approach. As for the experimental class, it has a mean value of 85.718 by applying the Computer Supported Collaborative Learning model based on digital literacy. Thus it can be concluded that the CSCL model based on digital literacy has a greater effect on student learning outcomes.

Anacova test results show that the Computer Supported Collaborative Learning (CSCL) model based on digital literacy has an influence on student learning outcomes in history subjects. This is reinforced by previous studies which state that collaborative learning can improve students' academic achievement, as well as the attitude and motivation to learn from students [3]. Collaborative learning using the CSCL model is considered effective enough to be used to improve the cognitive abilities of learners, for example when learners with high cognitive abilities are able to collaborate with those who have low cognitive abilities, then this will build a fairly good knowledge coordination between learners with different cognitive abilities [16]. Individual cognitive growth depends on successful social knowledge construction [18]. In addition to teaching learners to have social skills, collaborative learning models can also facilitate learners' communication skills, problem-solving skills, and help learners to have innovative and creative thinking in learning.

CSCL positively affects academic achievement as it provides permanent and easy learning, concretises abstract concepts, increases interest in the course, and solves examples by using applications [24]. In addition, CSCL also provides support for the learning process through content, self-regulation, and social regulation which will be realised in a special design to support the social, emotional, and cognitive progress of learners [14]. Through CSCL model, learners will be able to learn from multiple perspectives by discussing together to build more meaningful knowledge. CSCL is considered as a learning platform that can help learners to develop communication, collaboration, and higher order thinking skills (HOTS) which are considered necessary to develop in the twenty-first century [20]. The results of this study are also in line with the findings of Keser & Ozdamli [7] who highlighted the constructive impact of implementing collaborative learning models on Generation Z learners. This suggests that the CSCL model aims to understand the collaborative construction of knowledge that evolves from the understanding of a few individuals to a shared understanding through information sharing which is then negotiated together. Thus, the application of CSCL model in collaborative learning plays an important role to build group cognition.

The discovery learning model applied in the control class also had a good effect on students' learning outcomes. This model also emphasises the activeness of students and focuses on critical thinking as well as cooperation between students so that it will affect the indicators of student learning outcomes. The application of the discovery model in the control class can also solve learning problems and can realise the ability to think critically so that students can get good and quality learning outcomes.

This can also be seen from the difference in the average value obtained by students when the pretest is carried out with the average value obtained is 60 and when the posttest is carried out many of the students get an average value of 80. However, the CSCL model is better when compared to the discovery learning model applied in the experimental class. This is evident from the acquisition of the average value of students at the time of the pretest of 70 and the average value of the posttest of 88. The average value of the experimental class is slightly greater when compared to the average value of the control class. Based on the average value of the learning outcomes of the two classes, it can be seen that the experimental class is slightly superior to the control class. Thus, it can be concluded that students' learning outcomes are higher by applying the digital literacy-based CSCL model compared to the control class using the discovery learning model.

Therefore, both the digital literacy-based CSCL model and the Discovery learning model have the same influence on

learning outcome indicators, but the digital literacy-based CSCL model is superior in influencing the improvement and effectiveness of student learning outcomes in history subjects.

4. CONCLUSIONS

The conclusion of the research that has been done is that there is an effect of the digital literacy-based Computer Supported Collaborative Learning model on student learning outcomes. Based on the results of the anacova test on the learning outcomes variable, the significance value is 0.005 (0.005 < 0.05), so the hypothesis H_0 is rejected and H_a is accepted, which indicates that there is a significant effect. The magnitude of the effect of the learning model on student learning outcomes can be seen from the partial eta squared column with a value of 0,110 which is classified into the category of moderate effect or large influence. Based on the table of estimated marginal means, the mean value in the control class is 82.491 by applying the Discovery Learning model using a scientific approach. As for the experimental class, it has a mean value of 85.718 by applying the Computer Supported Collaborative Learning model based on digital literacy. Thus it can be concluded that the CSCL model based on digital literacy has a greater effect on student learning outcomes.

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