

The Effect Of Project-Based Learning Model Assisted By Powtoon Media On Students' Critical Thinking Skills In History Subjects

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Abstract: *The current educational paradigm in Indonesia is that educators are expected to be able to facilitate students with 21st century skills, these skills are often referred to as 4C which include communication, collaboration, critical thinking, and creativity. Critical thinking skills are important to be applied in the world of education because they can form students who are intellectually mature to face challenges in the era of the industrial revolution 4.0 and have qualified expertise in the future. Based on previous research, it shows that there is a low level of critical thinking of students in history subjects. Theoretical studies show the application of innovative learning models integrated with media can improve critical thinking. In theory, one of the learning models and media that can improve students' critical thinking is the project-based learning model and powtoon media. The purpose of this study was to examine the effect of project-based learning model assisted by powtoon on students' critical thinking in history subjects. This study used a quantitative approach with a quasi-experimental design; pretest-post-test; nonequivalent group design. The data analysis technique used ANCOVA test and estimated marginal means test. ANCOVA test results show sig. corrected model results show results of 0.000 ($0.000 < 0.05$), so simultaneously pretest and project-based learning model affect the critical thinking of students. The results of the learning model column show the significance of the performance and test results < 0.05 , so H_0 is rejected and H_a is accepted, the conclusion is that there is a significant effect of applying the project-based learning model on students' critical thinking in history subjects. The magnitude of the influence of the learning model on critical thinking can be seen in the partial eta squared value in the learning model column which shows a value of 0.131 and 0.145 including in the small category. The results of the Estimates Marginal Mean Test in the control class showed a difference in the mean pretest of 80.45 and posttest of 83.94, while in the experimental class showed a mean pretest of 78.75 and posttest of 86.33. In conclusion, there is a significant influence on critical thinking taught by applying the project-based learning model assisted by powtoon in history subjects. Recommendations from the results of this study, to teach conceptual material, with analyzing learning outcomes, the project-based learning model assisted by powtoon is recommended for use, because it is proven to have a significant effect.*

Keywords: Project Based Learning, Powtoon, Critical Thinking Skills

1. INTRODUCTION

The rapid development of technology has a significant impact on the world of education, the current educational paradigm in Indonesia is that educators are expected to be able to facilitate students with 21st century skills [29,50], these skills are often referred to as 4C which include *communication, collaboration, critical thinking, and creativity* [32,46,48]. Thus educators are required to equip learners in developing collaborative, creative, innovative, communicative and critical thinking skills. This is important to be implemented in the world of education because it can form students who are intellectually mature to face challenges in the era of the industrial revolution 4.0 and have qualified skills in the future [1].

Critical thinking skills are activities to identify ideas or ideas more specifically to detect a problem to solve problems by exploring information from various sources to create competencies to be achieved in learning [41]. Critical thinking is one of the abilities that must be developed as the main goal of education in society [33]. Critical thinking for students is important at every level of the education unit, because it can facilitate students to understand reality and be able to solve complex life problems [9].

Critical thinking skills are needed in the learning independence curriculum, through critical thinking competencies can encourage students to manage learning materials independently, therefore the role of educators as facilitators is needed to form independence and develop students' critical thinking in the learning process [40]. critical thinking is needed in learning so that students are able to analyze positive values in an event and apply them [13], in learning that has a context regarding social sciences and one of them is the subject of history critical thinking skills are needed [7]. This competency is very important to be implemented in history subjects, because it can guide learners in managing information rationally [35], and through critical thinking can facilitate learners to utilize past knowledge in order to understand [10].

Related to the *urgency of critical thinking of students in reality* is still relatively low, the problem of critical thinking of students can be found in previous research studies, research conducted by Fitrianiingsih (2015) shows that students' critical thinking skills in history subjects at the high school level are still low with a classical completeness of 55.30%. This is reinforced by Herlinatus' research (2022) which shows that 4.78% of students have a very high level of critical thinking, 11.19% of students have a high level of critical thinking, 35.16% of students have a sufficient level of critical thinking, 50.1% of students have a low level of critical thinking, 0% of students have a very low level of critical thinking category.

Learning in the era of independent learning provides many opportunities for the implementation of critical thinking education for students, there are forms of learning models that direct students to think critically [26]. one of them is the *project-based learning model* [3]. *Project Based Learning* is a form of constructivism learning where the learning process uses learner-centered learning that allows learners to work together in solving problems and learning together to form knowledge [2]. In project-based learning, learners are trained to actively participate to create innovative solutions to authentic problems through experiences [8]. The implementation of project-based learning models based on personal or real experiences can help learners reflect on their critical thinking by deeply analyzing the problems that exist in contextual materials and can be found in everyday life, thus, equipping good critical thinking skills will be beneficial [4]. Project Based Learning consists of several syntaxes, namely, *Start With Essential Question, Design a Plan for the Project, Create a Schedule, Monitor the Students and the Progress of the Project, Assess the Outcome, Evaluate the Experience* [12, 30].

Another learning model that is classified as innovative is the discovery learning model, the discovery learning model is a model that facilitates students to be active and directly involved in learning. Learners are emphasized to optimize their thinking for problem solving to formulate conclusions [50], while simultaneously training their critical thinking skills. Several studies were conducted to examine the application of discovery learning to learning. Research by (Dwijayanti, Na'im & Bambang, 2014; Susi, Suranto & Na'im, 2015) showed positive results applying the discovery learning model. Another study by Ike, Sumardi & Sri (2015) showed that the application of discovery learning improved the critical thinking skills and learning outcomes of students' history.

The emergence of the industrial revolution 4.0 has changed the view of education to innovate in utilizing technology in the learning process [25]. The implementation of technology in education by educators and students will make it easier to improve students' thinking skills [19]. This is in line with the independent learning policy that offers an independent learning culture by utilizing information technology according to life needs (5,), in the current digital era, technological developments are expected to be optimally utilized in various sectors including economy and business, politics to education, the use of multimedia in learning is one way to utilize technology in the field of education [38].

The *project-based learning* model combined with the utilization of technology and innovative media has a positive impact on success in the learning process [20], one of the innovative media in the 21st century is powtoon [39]. Powtoon is an innovative online media that is able to produce interesting animations by applying animated videos and this *software* is easy to use [24]. Powtoon is a SAS (*Software as a Service*) based animated presentation media processing software that can be accessed online which can be utilized as a presentation tool for educators in carrying out the learning process in the classroom [18]. The advantages of Powtoon media are the existence of various animation features, timeline settings in the application are considered easier than other applications, delivery of material, especially those related to concepts and visual images [16].

The results of research by Yulia and Ervinalisa (2017) state that powtoon learning media in learning history can lead students to focus more attention when educators explain historical subject matter which is often considered boring and can stimulate students in fostering students' curiosity in knowing something in the learning process, other research conducted by Irani, Sumardi, and Umamah (2022) the results showed that powtoon media was effective for improving students' *critical thinking skills* in history subjects, this was indicated by the increase in the average value of the *pretest* and *posttest* in the product trial with the category "very good". Based on the background description above, the researcher is interested in examining whether there is an effect of the *project-based learning* model assisted by powtoon media on students' critical thinking skills in history subjects, the researcher aims to verify the effect of the application of the *project-based learning* model on students' *critical thinking skills* in history subjects.

2. RESEARCH METHODS

The approach in this study used quantitative research with the form of *quasi experimental* design applied, namely *pretest-posttest, nonequivalent group design* [22]. The population in the study were all students in class XI IPS at SMA Negeri 1 Glenmore in the 2022/2023 school year, consisting of 6 classes with a total of 187 people. The sample used in this study was 60, in this study the retrieval was not done randomly but by conducting a homogeneity test to review whether the population variants were the same or not, while the determination of the research group was based on the average daily test results of history subjects.

Table 1: Homogeneity Test Results

Data	Levene Statistic	N	Sig.	Description
History Test Results	0,708	187	.0618	Homogen

Source: primary data processed

Based on the *output* from table 1, the results of the homogeneity test of the research population, it is known that the significance value (*p-value*) of the *Levene test* is 0.061 ($0.061 > 0.05$) which means that it is very significantly different, so it can be concluded that the daily test score data has a homogeneous value variety. This means that the requirement of homogeneity of variance is met. Next, sample selection is done by calculating the average value between classes.

Table 2: : Average Daily Test Score

Class	Average
11 IPS 1	80,45
11 IPS 2	78,75
11 IPS 3	75,90
11 IPS 4	77,25
11 IPS 5	79,65
11 IPS 6	76,10

Source: primary data processed

Based on the results of the average daily test scores above, 11 IPS 2 class was chosen as the experimental class taught with the project-based learning model and 11 IPS 1 class as the control class taught with the discovery learning model. The selection of two classes with a high average aims to provide treatment for critical thinking skills need to have a high understanding, the assumption is that if the average value of the daily test results is higher, it is easy to be invited to think critically so that it can affect the learning outcomes obtained by students.

The instrument used to measure *critical thinking skills* in this study is a multiple choice test and non-test (work performance) . multiple choice test contains 20 items that refer to the indicators of *critical thinking skills* in Bloom's Taxonomy C4 cognitive domain (analyze), the instrument in the form of a critical thinking test was first tested for validity and reliability. Testing the validity of the items, the researcher chose to use the Product moment correlation formula using the help of *SPSS 23 Windows software*. While the reliability test in this study was calculated using the *Alpha Cronbach formula*. non-test research instruments, namely performance in the form of paper. Each indicator of critical thinking skills has a score of 4 if it is correct in each criterion to a score of 1 for those who do not meet the criteria by referring to Facione's (2010) critical thinking indicators which include interpretation, evaluation, inference explanation, self regulation.

The data analysis technique used in this study used ANACOVA assisted by *SPSS 23 Windows software* and continued with the Estimates Marginal Means test. Before carrying out the hypothesis testing stage, first carry out the prerequisite analysis test which includes normality test, regression homogeneity test and linearity test.

3. RESULTS AND DISCUSSION

3.1 Results

A. Instrument Testing

1. Validity Test

Validity test is a test-shaped instrument by comparing the contents of the instrument with the subject matter taught [44]. This study uses content validity as a measuring tool for *critical thinking skills* in terms of test content. Testing the validity of each instrument item uses the correlation of each item's score with the total score. If $r_{hit} > r_{tab}$ then the item is considered valid and vice versa, researchers use the *Product Moment* correlation formula with the help of *SPSS 23 for windows software* to test the validity of the question items data from the validity test results of the two instruments, namely the pretest and posttest, each consisted of 20 items arranged with different questions but still at the same cognitive level, namely C4 (Analysis). The validity test results on all pretest and posttest items show the *r*count value is greater than the *r*table. The overall significance value of the items is smaller than the significance level of 0.05 or 5%, which means that the value is significant. So it can be decided that all pretest and posttest question items in the validity test are declared valid and suitable for research.

2. Reability Test

Reliability is a series of measuring instruments for the level of accuracy and consistency of the test as a research instrument. Reliability is how far the measurement results can be trusted [6,42]. The *pretest* and *posttest* instruments given were tested for reliability first. The reliability test was calculated with *Alpa Cronbach* assisted by *SPSS 23 for windows software* by measuring the accuracy of the instrument using Guilford's (1956) categories which are described as follows:

- a. $0.80 < r_{11} \leq 1.00$ very high reliability
- b. $0.60 < r_{11} \leq 0.80$ high reliability
- c. $0.40 < r_{11} \leq 0.60$ moderate reliability
- d. $0.20 < r_{11} \leq 0.40$ low reliability
- e. $-1.00 < r_{11} \leq 0.20$ very low reliability

Table 3: Critical Thinking Skills Test Reliability Results

Variables	N	Cronbha Alpha Coefficient	Description
Critical Thinking (Pretest)	20	0,963	Very High Reliability
Critical Thinking (Posttest)	20	0,973	Very High Reliability

Source: Primary data processed

The output of table 3 shows the results of the reliability test of the pretest and posttest critical thinking skills multiple choice question instruments have Cronbach's Alpha values of 0.963 and 0.973. Both test instruments are located at a reliability coefficient of $0.80 < r_{11} \leq 1.00$ with very high reliability criteria. So, it is concluded that the pretest and posttest critical thinking skills multiple choice question instruments are declared reliable and have good consistency used in research.

B. Prerequisite Test Analysis

1. Normality Test

The normality test is used to show that the research data is normally distributed. The normality test formula used is Kolmogorov-Smirnov which is assisted by SPSS for Windows version 23.

Table 4: Results of Normality Test for Performance

Data	Class	Kolmogorov-Smirnov		
		Stastic	Df	Sig.
Pretest	Control	.107	30	.200
	Experiment	.140	30	.141
Posttest	Control	.144	30	.111
	Experiment	.117	30	.200

Source: Primary data processed

Table 5: Test Normality Test Results

Data	Class	Kolmogorov-Smirnov		
		Stastic	Df	Sig.
Pretest	Control	.107	30	.200
	Experiment	.137	30	.154
Posttest	Control	.144	30	.111
	Experiment	.120	30	.200

Source: Primary data processed

The output results from Table 4 show the normality test of pretest and posttest data for the control class performance is normally distributed with a sig value. $0.200 > 0.05$ and $0.111 > 0.05$. While the results of the normality test of pretest and posttest data for experimental class performance tests are normally distributed with a sig value. $0.141 > 0.05$ and $0.200 > 0.05$. While table 5 shows

the results of the normality test of the pretest and posttest data of the control class are normally distributed with a sig value. $0.200 > 0.05$ and $0.111 > 0.05$. While the results of the normality test of the experimental class pretest and posttest data were normally distributed with a sig value. $0.154 > 0.05$ and $0.200 > 0.05$.

2. Regression Homogeneity Test

Regression homogeneity test is a test to determine whether there is a relationship between covariate and independent variable provided that the sig. covariate independent variable is more than 0.05 (sig. > 0.05). The assumption is met if there is no relationship between covariate and independent variable. Regression homogeneity test assisted by SPSS 23 for windows

Table 6: Results of Homogeneity Test of Performance Regression

Data	Type III Sum of Squares	Df	Mean Square	F	Sig.
Class * Pretest	78.125	1	78.125	.935	.338

Source: Primary data processed

Table 7: Regression Test Homogeneity Test Results

Data	Type III Sum of Squares	Df	Mean Square	F	Sig.
Class * Pretest	506.939	1	506.939	3.855	.550

Source: Primary data processed

Looking at the results of the regression homogeneity test output in table 6 and table 7 shows the sig value. $0.550 > 0.05$ and $0.338 > 0.05$, meaning that both regression homogeneity values for performance and student tests are greater than 0.05. So it can be concluded that the assumption of regression homogeneity is fulfilled.

3. Linearity Test

The Linear Between Covariate and Dependent Variable test is the last assumption before conducting the Anacova test to determine whether there is a linear relationship between the covariate and the dependent variable using SPSS 23 for windows.

Table 8: Results of Linearity Test for Performance

Data	Type III Sum of Squares	Df	Mean Square	F	Sig.
Pretest	1.073	8	.134	.489	.858

Source: Primary data processed

Table 9: Test Linearity Test Results

Data	Type III Sum of Squares	Df	Mean Square	F	Sig.
Pretest	.286	7	.041	.146	.994

Test Linearity Test Results

Based on the output of the linearity test results in tables 8 and 9, the Sig. Deviation From Linearity $0.858 > 0.05$ and $0.994 > 0.05$, it can be concluded that there is a statistically significant linear relationship between the covariate (pretest score) and the dependent variable.

C. Hypothesis Test

Hypothesis testing was conducted to answer the problem formulation in the study. In this study, pretest and posttest data from experimental and control classes will be tested using ANCOVA and Estimates Marginal Means tests using the SPSS 23 for windows program.

Table 10: Anacova Test Performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1375.081 ^a	2	687.540	4.851	.011	.145
Intercept	6093.178	1	6093.178	42.987	.000	.430
Pretest	46.637	1	46.637	.329	.568	.006
Model	1222.962	1	1222.962	8.628	.005	.131
Error	8079.503	57	141.746			
Total	291675.000	60				
Corrected Total	9454.583	59				

a. R Squared = .278 (Adjusted R Squared = .257)

Source: Primary data processed

Table 10: Anacova Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7140.984 ^a	2	3570.492	38.503	.000	.575
Intercept	7396.189	1	7396.189	79.758	.000	.583
Pretest	14.635	1	14.635	.158	.693	.003
Model	5582.987	1	5582.987	60.205	.000	.145
Error	5285.750	57	92.732			
Total	347830.000	60				
Corrected Total						

a. R Squared = ,164 (Adjusted R Squared = ,150)

Source: Primary data processed

Based on the output of the results of the Anacova test for performance and critical thinking tests presented in tables 9 and 10, the results of the corrected model column show the result of 0.000 ($0.000 < 0.05$), so simultaneously the pretest and the project-based learning model affect the critical thinking of students. The results of the learning model column show the significance of the performance and test < 0.05 so that H_0 is rejected and H_a is accepted, the conclusion is that there is a significant effect of applying the project-based learning model on students' critical thinking in history subjects. So it can be concluded, the magnitude of the effect of the learning model on critical thinking can be seen in the partial eta squared value in the learning model column which shows a value of 0.131 and 0.145 including in the small category. So it can be concluded that the project-based learning model has little effect on students' critical thinking in history subjects. The criteria for the magnitude of the influence can be seen with the Effect Size Criteria table presented below.

Table 11: Effect Size Criteria

Effect Size	Criteria
0,1	Small Effect
0,3	Medium Effect
0,5	Large effect

Sumber: Cohen, 1995

After conducting the Anacova test, the next step is to look at the results of Estimate Marginal Means to determine whether there is a difference in the average post-test in the control and experimental classes.

Table 11: Estimates of Marginal Means (Critical Thinking Test)

Dependent Variable: Posttest				
Class	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Experiment Class	86.335a	1.941	82.447	90.222
Control Class	83.945a	1.868	60.204	67.686

Source: Primary data processed

Based on table 11 shows the *mean* value of the post-test critical thinking of the experimental class obtained a *mean value of* 86.335 while the control class obtained a *mean value of* 83.945, so it can be concluded that the class given the treatment of the *Project Based Learning* model is superior in giving effect to *critical thinking skills* than the class given the treatment of the *Discovery Learning* model. So that the project-based learning model has more effect on learning outcomes compared to the discovery learning model.

3.2 Discussion

This study aims to examine the effect of project-based learning model on students' critical thinking in history subjects. This study consists of two research groups, namely the experimental group taught using the project-based learning model and the control group taught using the discovery learning model. Researchers analyzed whether there was a significant effect on the critical thinking of students who were given treatment using the project-based learning model. Data analysis using ANCOVA test with pretest as covariate.

Based on the output of the results of the Anacova test for performance and critical thinking tests presented in tables 9 and 10, the results of the corrected model column show the result of 0.000 ($0.000 < 0.05$), so simultaneously the pretest and project-based learning model affect the critical thinking of students. While the learning model column shows the significance of the performance and test < 0.05 so that H_0 is rejected and H_a is accepted. The magnitude of the influence of the learning model on critical thinking can be seen in the partial eta squared value in the learning model column which shows a value of 0.131 and 0.145 including in the small category. After conducting the ANCOVA test, the next step is to look at the results of the Estimate Marginal Means test to determine whether there is a difference in the average posttest in the control and experimental classes. Based on table 11, the mean value of the post-test critical thinking of the experimental class obtained a mean value of 86.335 while the control class obtained a mean value of 83.945.

The results of this study state that there is an influence on the critical thinking skills of students who are taught with a project-based learning model and a discovery learning model, indicating that H_0 is rejected and H_a is accepted. This is proven by the ANACOVA test. Meanwhile, to find out which one has a greater influence, the estimated marginal means are used, the difference in the average value obtained by the class given the discovery learning treatment obtained a pretest value of 80.45 and a posttest of 83.94. However, the class that was given the project-based learning model treatment was better than the discovery learning model. This is evident from the average obtained in the experimental class, namely the pretest value of 78.75 and the posttest value of 86.33. The average value of the experimental class is higher than the control class. Based on these data, it is known that the mean value of the experimental class has a higher value than the mean value of the control class. Therefore, the project-based learning model and the discovery learning model both have an influence, but the project-based learning model is superior in influencing students' critical thinking in history subjects.

Both are innovative learning models and have a positive effect on critical thinking skills. However, the superiority of the project-based learning model lies in its synthesis, namely start with essential questions, design a plan for the project, create a schedule, monitor the students and the progress of the project, assess the outcome, evaluate the experience [12,30]. The steps of the project-based learning model contain critical thinking indicators and facilitate students to practice critical thinking. Teaching critical thinking skills is in line with teaching problem solving skills, both of which can be done using the project-based learning model [43], project-based learning also makes students the core of the learning activity process (Student Centered) and students have freedom in the learning process to form knowledge [2, 23]. Project-based learning has great potential in creating a more meaningful learning experience for learners [46], the implementation of project-based learning models based on personal or real experiences can help

learners reflect on their critical thinking by deeply analyzing the problems that exist in contextual material and can be found in everyday life, thus, equipping good critical thinking skills will be useful [4], so that the critical thinking skills of learners can be developed by training learners in exploring contextual learning materials independently. Project-based learning supported by contextualized materials in the learners' environment can have an impact on increasing learners' critical thinking skills [31].

This research strengthens previous research studies. Project-based learning has proven successful in improving students' knowledge and critical thinking skills [4, 36]. Project based learning is able to improve thinking skills [37], the Project Based Learning model has a significant effect on critical thinking skills and has a positive impact on students' critical thinking skills in history subjects [34]. The implementation of project-based learning is able to improve students' critical thinking skills and history learning outcomes [21]. Finch and Daegu's research (2012) states that the project-based learning model combined with the use of technology and innovative media has a positive impact on success in the learning process, one of the innovative media in the 21st century is powtoon [39]. powtoon learning media in learning history can lead students to focus more attention when educators explain historical subject matter which is often considered boring and can stimulate students in fostering students' curiosity in knowing something in the learning process [48], other research conducted by Irani, Sumardi, and Umamah (2022) the results showed that powtoon media was effective for improving students' critical thinking skills in history subjects.

Based on the explanation above, it can be concluded that the project-based learning model integrated with the use of technology and innovative learning media powtoon in learning has a positive influence on students' critical thinking skills.

4. CONCLUSION

The conclusion of the research that has been done is that there is an effect of the project-based learning model on students' critical thinking in history subjects. The ANACOVA test results show that there is a significant effect of critical thinking skills of students who are taught with a project-based learning model with a sig value. 0,000 ($0,000 < 0,05$). While the results of Estimates Marginal Means show the mean pretest of 80.45 and posttest of 83.94, while in the experimental class showed a mean pretest of 78.75 and posttest of 86.33. Based on the mean value, it can be seen that the critical thinking skills of experimental class students taught with the project-based learning model are higher than the critical thinking skills of control class students taught with the assisted discovery learning model. So, the conclusion of this research is that the project-based learning model can improve students' critical thinking skills in history subjects.

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