

Flipped classroom in history learning to improve students' critical thinking

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ABSTRACT

The flipped classroom is very helpful for students to understand learning material, but it is still very minimally used, especially in history learning. This study analyzed the effect of the flipped classroom model in history learning to improve students' critical thinking. This study employed a quasi-experimental non-equivalent control group design, by dividing into two class groups, namely experimental and control. The sample was 121 students who were selected through cluster random sampling technique. The data collection was through observation, interviews, and instruments in the form of critical thinking tests. Data analysis used an independent sample t-test and N-gain score test to analyze the effect of a flipped classroom in history learning to improve critical thinking. The results showed that the flipped classroom in history learning had a significant effect on improving students' critical thinking skills as evidenced by the independent sample t-test test with a significance value of $0.000 < 0.05$, and the N-gain score test which was included in the moderate criteria. So, the flipped classroom model in history learning is very suitable to be used and implemented. Hence, learning objectives are achieved so that history learning can run well and optimally.

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1. INTRODUCTION

The development of information and communication technologies in the 21st century is now progressing at a rapid pace. The development of more sophisticated information and communication technologies is accompanied by their role in various aspects of human life [1]. The sophistication of information and communication technology provides an opportunity to improve the quality of teaching and learning by opening access to find extensive learning resources for students. The development of digital technology today certainly has provided many advantages for anyone in accessing various information and connecting without crossing borders, without being limited by space and time [2]. In today's world of education, students spend a lot of time using various technological media such as computers, laptops, and smartphones to interact with friends, teachers and look for various learning references from the internet. The positive impact of this technological growth has affected the concept of technology-based learning [3].

Technology-based learning is an opportunity to take advantage of it so that education itself is growing. With the sophistication of technology, learning patterns can shift to digital learning, which is not only done in the classroom but can be done outside the classroom, with internet capital and gadgets [4]. Because a lot of free learning materials are available on various websites that have been uploaded by teachers to be used as learning resources. Hover and Wise [5] explained that in today's digital age, every student has

free access to various educational resources from the Internet on educational sites such as educational videos and e-books. Students can learn from different digital sources from anywhere and at any time. [6]. The development of information technology has changed a lot of learning models that tend to be passive to active and from traditional models combined with innovative digital-based learning models [7]. Moreover, the application of learning with a traditional approach that tends to focus on the teacher (teacher center) as a knowledge center is no longer relevant to the development of technology in today's digital era.

The problem is that there are still many teachers who apply traditional learning by ignoring the sophistication of technology itself so that it can make students more passive in learning. Dolch and Zawacki-Richter [8] said that traditional/conventional learning makes students bored and less active because it is teacher-centered. Titthasiri [9] added that the conventional learning model makes students passive because the teacher's role is too excessive so that there are very few opportunities for students to be active which can hinder critical, creative, imaginative, and independent learning. The solution to this problem can be minimized by diverting learning in digital form such as video or web learning, which allows students to learn various materials from anywhere and anytime [10], [11]. With such learning, it will certainly be very helpful and make it easier for students to study independently or repeat learning materials according to their needs.

Today's digital learning has adapted itself along with the advancement of technology or the so-called industrial revolution era 4.0. The era of the industrial revolution 4.0 places more emphasis on the pattern of the digital economy, artificial intelligence, big data, robotics, and so on or known as disruptive innovation [12]. Facing these challenges, of course, the learning system is required to change, because currently there are many millennial or digital native students, so that teacher competencies are required to be more, at least able to have five competencies: i) Educational competence; ii) Competence research; iii) Competence for technological Commercialization; iv) Competence in globalization; and v) Competence in future strategies [13], [14]. Of these five teacher competencies, they have synergies with technology or digital which are required to be creative and innovative, so that the competencies possessed by teachers can predict exactly what will happen in the future and their strategies.

Several previous studies on digital-based learning strategies to make it easier to achieve goals have been carried out such as project-based learning, problem-based learning, discovery learning, flipped classrooms, direct (expository) learning, and others [15], [16]. Research proves that learning models that are under learning objectives and student characteristics can improve thinking and learning outcomes. In line with previous research [17], the application of flipped classroom in learning can foster students' critical thinking. Kong [18] added flipped classroom when applied in learning can improve students' critical and creative thinking because the concept used is different from conventional learning.

Flipped classroom learning, known as a reverse class, is a new learning model among other learning models. With the use of the flipped classroom in learning, learning materials are delivered to students outside the classroom through electronic media, so that the time in the classroom is for direct practice activities, meaning that the teacher does not convey much material anymore [19]. This learning can focus on students (student center), which is very dependent on the ability of students to learn independently by utilizing technology. Flipped classroom is an implementation of a rotational model in which students cycle on a fixed schedule between teacher-led practice (or projects) at school and online delivery of after-school content and instruction [20], [21]. The application of learning with the flipped classroom strategy is effective in improving students' critical thinking skills because there is a process of interaction between students, teachers, and the learning environment that results in changes in behavior, learning outcomes, and students' thinking skills [22].

Critical thinking is needed to analyze a problem to the stage of finding a solution. Critical thinking skills are needed to face global challenges and various life problems that cannot be controlled [23]. Having the ability to think critically can distinguish the positive and negative sides, then filter the various influences that enter and adapt them to the conditions and culture of their nation. Critical thinking ability is a human way of thinking to respond to someone by analyzing facts to form judgments, so this ability needs to be trained and developed [24]. Today's conditions that are growing rapidly require humans to have the ability to think critically to be able to answer various existing global challenges [25], [26]. This means that students are not only required to be able to complete assignments or get good grades, but students are also required to have critical thinking skills also in the learning process so that students can decide which ones are right and wrong, which ones need to be followed and left out, and not to participate. dragged down by the negative currents of globalization [27].

Flipped classroom is a learning model that uses Information Technology in learning which is thought to be able to help students to improve their critical thinking skills [28], [29]. Because this learning model actively involves students learning independently through websites and video media before entering class [30]. Classes are used only to interact actively in solving difficult problems so that they can build students' critical thinking skills. This means that students can use their time in class discussions and ask the teacher to help those who have difficulty completing their assignments.

Flipped classroom can be applied in various subjects, one of which is in learning history. Learning using the flipped classroom or reverse class is a learning strategy that requires students to construct their knowledge before entering the classroom [31]. Learning history using flipped classroom is familiar because its implementation uses technology and digital assistance. Through technology, history learning will be more innovative and optimal in achieving its goals, so that students do not feel bored anymore. Because in it students will be directly involved in the history learning process so that it will be student-centered [32]. In addition, the application of the flipped classroom strategy in history learning will save time because in-class students and teachers only carry out discussions so that the class becomes more active.

Previous research [33] explained that learning history using the flipped classroom is effective because in the learning process it can liven up the classroom atmosphere which requires students to be more active. Because with the flipped classroom, students can learn historical material outside of class that has been shared by the teacher through a digital platform. Students will study the material and do assignments outside the classroom so that in class they only discuss and discuss the material and assignments that have been given by the teacher [34]. With the application of the flipped classroom in history learning, it is attempted to improve critical thinking because students are required to solve problems independently, which stimulates students to always think critically, so that students will easily solve problems, know their abilities, be open-minded, and can communicate well. Thus, this study analyzed the effect of the implementation of the flipped classroom in history learning to improve students' critical thinking and the materials used in historical thinking in class X senior high school.

2. RESEARCH METHOD

The study used a quantitative method with a quasi-experimental non-equivalent control group. It analyzed the differences and effects of using flipped classes in learning history [35]–[37]. The population used class X high school students in Yogyakarta, namely state senior high school 8 Yogyakarta and state senior high school 9 Yogyakarta with sample of 121 students. In determining the sample, it is divided into two class groups, namely the experimental class (with the treatment in question) and the control class (untreated or conventional). Before treatment, the group must first pass a pre-test and post-test to be able to analyze the changes occurring between the two groups.

The sampling technique used random cluster sampling, dividing the sample into several separate groups (clusters). The data collection techniques used are observation, interviews, and tests (pre-test and post-test). This test is used to analyze the improvement in students' critical thinking. The data analysis in this study used the t-test statistical analysis from an independent sample and multiple regression to analyze whether there was a flipped class effect on history learning in history learning to improve critical thinking based on pre-test and post-test scores. The precondition test uses normality and homogeneity tests. This precondition test is performed to determine whether the analysis of the data for hypothesis testing can continue or not. The prerequisite test is performed in such a way that the population data is normally distributed, and the compared groups are homogeneous so that they can be continued in the hypothesis analysis test stage.

Data analysis in this study was assisted by the SPSS 22 program. Data analysis of the normality test used the Kolmogorov-Smirnov path model with a significance level of $p > 0.05$. Homogeneity test using One Way analyses of variance (ANOVA) analysis through Levene's Test with a significance level of $p > 0.05$. An independent sample t-test was conducted to determine the difference in significance level between the two classes (experimental and control) using a significance level of $p < 0.05$. While the N-gain score test is used to determine the increase in students' critical thinking skills which describes the improvement indicators as in Table 1. It is indicating that the N-gain score is greater than 0.7 ($g > 0.7$), then the critical thinking indicator is in the high category. If the score is between 0.3 and 0.7 ($0.3 \leq g \leq 0.7$) then it is in the medium category, while the score is less than 0.3 ($g < 0.3$) then it is in a low category [38].

Table 1. Description of N-gain scores

N-gain value	Criteria
$g > 0.7$	High
$0.3 \leq g \leq 0.7$	Medium
$g < 0.3$	Low

3. RESULTS

3.1. Descriptive of statistical analysis

Table 2 explains that the description of the statistical analysis of the number of samples is 121 detailing 89 experimental classes and 32 control classes. The mean result of the experimental class was 70.05 pre-test and 82.80 post-test, while the average result of the control class was 69.06 pre-test and 76.28 post-test. Based on the mean scores obtained from the two class groups, there are differences so that the implementation of a flipped classroom for learning history affects students' critical thinking skills.

Table 2. Statistical description

Class	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test experiment	89	51.00	89.00	70.0562	9.28263
Post-test experiment	89	55.00	98.00	82.8090	8.03526
Pre-test control	32	54.00	87.00	69.0625	9.35996
Post-test control	32	64.00	90.00	76.2813	7.41939
Valid N (listwise)	32				

3.2. Pre-requisite analysis test

An essential test is directed to decide if the theory testing can be proceeded or not. Information change necessitates that the information comes from an ordinarily dispersed populace and the gatherings being thought about are homogeneous. Examination of difference of essential test information utilized ordinariness and homogeneity test, ordinariness test utilized Kolmogorov-Smirnov way model, while homogeneity test utilized single direction ANOVA.

3.2.1. Normality test

Table 3 shows that the consequences of the ordinariness test examination utilizing the Kolmogorov-Smirnov model. The obtaining of the critical worth of the exploratory class bunch is 0.153 and the control class is 0.200. At that point, the information from these two classes is typically disseminated because the procurement worth of the two classes is more noteworthy than 0.05 (significance $p > 0.05$).

Table 3. Normality test results

Class	Kolmogorov-Smirnov			Description
	Statistic	df	Sig.	
Experiment	.134	89	.153	Normal
Control	.122	32	.200	Normal

3.2.2. Homogeneity test

In light of Table 4, the consequences of the homogeneity trial of the control class and exploratory class acquired an importance worth of 0.125. At that point, the two gatherings analyzed were pronounced homogeneous. It is because of the procurement of the critical worth of the two classes was more prominent than 0.05 (significance $p > 0.05$).

Table 4. Homogeneity test results

Class	Test of Homogeneity of variances				Description
	Levene's Statistic	df1	df2	Sig.	
Experiment and control	2.364	1	121	.125	Homogeny

3.3. Hypothesis testing analysis with independent samples T-test and N-gain Score

Considering the yield of Table 5, the consequences of the free example t-test acquired the worth of Sig. (2-followed) was $0.000 < 0.05$, because the importance worth of the two classes was under 0.05 (significance $p < 0.05$). Then there is a difference in the average value of the results of students' critical thinking using the flipped classroom in history learning with conventional learning models. The results of the independent sample t-test test have been strengthened by the results of the N-gain score which shows that the implementation of the flipped classroom in history learning can improve students' critical thinking skills, which can be seen in Table 6.

Table 5. Test results of independent sample T-test

Result	Levene's Test for equality of variances		t-test for equality of means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
								Lower	Upper
Equal variances assumed	1.031	.312	3.861	119	.000	6.23864	1.61587	3.03906	9.43821
Equal variances not assumed			4.004	61.934	.000	6.23864	1.55797	3.12423	9.35304

Table 6. N-gain score test results

Class	N-gain Score	Criteria
Experiment 1	0.4	Medium
Experiment 2	0.5	Medium
Experiment 3	0.5	Medium
Control	0.2	Low

The output results of Table 6 show that the N-gain values obtained from experimental classes 1, 2, and 3 are 0.4 and 0.5 with a level ($0.3 \leq g \leq 0.7$) which is categorized as medium. The N-gain score from the control class was 0.2 with a level ($g < 0.3$) in the low category. The results of the N-gain score analysis have shown that there is a significant increase in the gain from the average test score of the experimental class with the control class. The results of the average pre-test experimental class 1 were 75.06 and posttest was 85.31, experiment 2 pretest was 70.71 and posttest was 81.75. Experiment 3 pretest 62.80 and posttest 80.96, while the average score of the control class pretest was 69.0 and posttest was 76.28. Thus, the results of the N-gain score have explained that the use of the flipped classroom model in history learning is proven to improve students' critical thinking skills.

4. DISCUSSION

The outcomes acquired show that the flipped study hall in history learning can assume a part in assisting understudies with sharpening basic reasoning abilities so understudies will be keener on learning history since it is joined through innovative complexity. The flipped study hall is essential for an advanced-based learning model, the use of which will make it simpler for understudies to learn, like learning recordings, showing materials, and so on, which understudies can learn before the learning system in class. Because the flipped classroom is a learning model in which students before studying in class learn the material first at home according to the assignments given by the teacher [39]. This model is also used by teachers when there are students who are not present in class for some reason, so the teacher can make videos of what he teaches and give them to students who are not in the class [40].

The flipped classroom did have a significant effect on increasing students' critical thinking in learning history [41]. Because students will be actively involved, so teachers can provide better opportunities for instructors in dealing with students with diverse abilities and student difficulties. Moreover, history learning, which has always had a negative impression on students, can be helped by the presence of various digital-based learning models, one of which is the flipped classroom model [42]. Through this strategy, history learning will certainly be maximized and optimal to complete its objectives.

The position of learning history today shows that its role is very important in honing, developing, and shaping students as the next generation of the nation by having characters that are under their nation. However, the fact is reversed, a negative paradigm always haunts history learning which is difficult to remove, so that in its implementation and meaning it is still often misunderstood by most students. The problem is certainly inseparable from learning which tends to be conventional so that students are less interested and bring up pragmatic practical thinking habits [43], [44]. So, it is very necessary to learn history in today's digital era, teacher professionalism is needed in designing and designing history learning by utilizing technological sophistication or digital, which can make it easier to introduce historical concepts to students [45]. Flipped classroom in history learning to improve critical thinking includes the substance of the teacher's innovative steps in developing his professionalism so that history learning will be much better.

Flipped classroom in history learning is needed to improve students' critical thinking skills [46]. Critical thinking has relevance to the concept of history learning itself because history learning must be able to encourage students to think critically-analytically in utilizing past knowledge, to understand the time dimension of life, develop intellectual abilities and skills, and be useful to instill awareness [47]. Critical thinking can be built through history learning so that students can have a selective attitude in accepting and understanding every issue and being more careful in acting and behaving.

According to Aidinopoulou and Sampson [48], the use of the flipped classroom in history learning will be very helpful in honing their thinking skills so that they become more critical, rational, and wise students in acting, who do not fall into inappropriate/good information. In addition, the use of the flipped classroom in history learning is sought to be able to change the negative paradigm that does not always memorize and tell stories but has exemplary, character, and educational values that make students wiser and mature through learning history [49], [50]. The current era of utilizing technology is required in the learning process because today's students are closer to the internet and gadgets that can obtain inaccurate information so that the level of trust in other people and teachers can be reduced [51], [52]. So, the novelty of this research is that learning history using the flipped classroom is attempted to be able to improve students' critical thinking as an innovation in history learning, the goal can be achieved maximally.

5. CONCLUSION





Flipped classroom in history learning significantly affects working on understudies' basic speculation by having authentic thinking with the goal that understudies will be savvier in acting. The impact of the flipped study hall to further develop basic reasoning is demonstrated through the aftereffects of the autonomous example t-test speculation investigation test with the obtaining of an importance level of 0.000 and the procurement of an N-gain score in the medium classification, which implies that the flipped classroom in history learning. Meanwhile, students' critical thinking can increase even though it is not high, but it has shown an increase in the test scores that have been tested. The implications of this research, in general, can be used as a reference for other researchers with similar themes, while practically recommending teachers and schools to use the flipped classroom model in learning, both history, and other subjects so that learning objectives can be achieved optimally. So, the learning process can be more meaningful, especially in an era that is all digital or technology that has developed rapidly.

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