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The Implementation of Flipped Classroom Learning Model assisted by Cloud Classroom in Improving Student Engagement in History Lessons

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Abstract. The flipped classroom learning model is an innovation that provides a new instructional pattern that is highly beneficial for changing the learning process. It not only demands learning to take place inside the classroom but also requires students to prepare the material beforehand at home or outside the classroom. This model is student-centered and aims to enhance student engagement, understanding, and retention by reversing the traditional classroom teaching approach. The flipped classroom has an impact on student engagement in learning by improving the quality of students' efforts in effective learning activities and their overall emotional state during the learning process, which leads to learning success. The researcher using CloudClassRoom as learning media to foster student engagement in learning activities. The objective of this research is to determine the influence of the flipped classroom learning model on student engagement in the history lessons of the Grade XI Science Program at SMAN 1 Genteng. This research adopts a quantitative approach that examines objective theories by investigating the relationships between variables. Quantitative research starts with formulating hypotheses regarding the predicted relationships between two or more variables. This study utilizes an experimental method, which involves testing the effects of a controlled intervention on the research outcomes, considering other influencing factors as well.

Keywords: Learning Model, Flipped Classroom, Student Engagement, Cloud Classroom

I. Introduction

According to the Ministry of Education and Culture Regulation No. 16 of 2022, which contains process standards, the principles of learning activities used are as follows: (1) learning is conducted by encouraging interaction and active participation of students by utilizing communication and information technology, (2) learning is conducted in a learning environment that can promote active participation of students by involving them in the preparation of learning plans, (3) the role of educators is no longer solely as the only source of learning, but shifts to become facilitators of learning activities, (4) classroom teaching and learning activities provide space for students to express their opinions, self-actualize, and experiment, (5) students can self-regulate in the learning process. To accommodate these learning principles, a learning model is needed that can maximize student engagement in learning activities by utilizing technology and efficient time management in the classroom.

Following the Ministry of Education and Culture Regulation No. 16 of 2022, which contains process standards, the principles of learning activities used are as follows: (1) learning is conducted by encouraging interaction and active participation of students by utilizing communication and information technology, (2) learning is conducted in a learning environment that can foster. The flipped classroom has several advantages. Firstly, it contributes to making students take responsibility for their learning (Yildirim, 2016:2). Secondly, students are more prepared to engage in interactive and high-level activities during face-to-face sessions, such as problem-solving, discussions, and debates (Gaughan, 2014). The flipped classroom model seems to overcome some challenges of traditional teaching and paves the way for active learning strategies and the use of class time for higher-level Bloom's taxonomy activities, such as application, analysis, and synthesis (Krathwohl, 2002; Nouri, 2016). Gilboy et al., as cited in Nouri (2016:2), demonstrate that students gain a better understanding from pre-class learning, leading to deeper engagement during focused class time. Flipped classroom provides more time for interaction and discussion with students since they have learned the main content before the class begins (Gaughan, 2014: 221). Flipped classroom requires students to be responsible for watching videos and asking relevant questions, while in class, educators provide feedback, and students are responsible for completing and sharing their work (Bergmann & Sams, 2012: 16). Several studies report that students are pleased with the opportunity to learn at their own pace and prefer the flipped classroom approach over the traditional one (Nouri, 2016: 2).

The role of educators in flipped classroom learning goes beyond delivering information; they also assist students in solving learning difficulties, while students have responsibility for their learning activities and pace (Yildirim, 2016: 2; Gokce, 2018: 334). In line with Yildirim's viewpoint, as described in Phillips and Trainor (2014: 521) and depicted in Figure 2.1 below, flipped

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classroom involves a transformation of the teacher's role from a content provider to a coach or instructor who guides students through a series of experiential learning activities. These learning activities are designed to be varied, engaging, and interactive. According to Sams, as cited in Danker (2015: 175), the flipped classroom approach centers around the students, focusing on their learning and placing more responsibility for learning on the student's shoulders rather than the educator's, while providing them with greater encouragement to discover knowledge independently. By flipping the classroom, a significant amount of class time can be dedicated to delivering knowledge, and educators can engage with students through other learning activities such as discussions, problem-solving initiated by students, hands-on activities, and guidance (Gokce, 2018: 334). Therefore, flipped classroom is a blended learning approach that revolves around students. They learn the content outside the classroom, allowing in-class time to be dedicated to discussions, problem-solving, and activities aimed at enhancing student engagement, understanding, and retention. The flipped classroom model and design process shown in Figure 1 below.

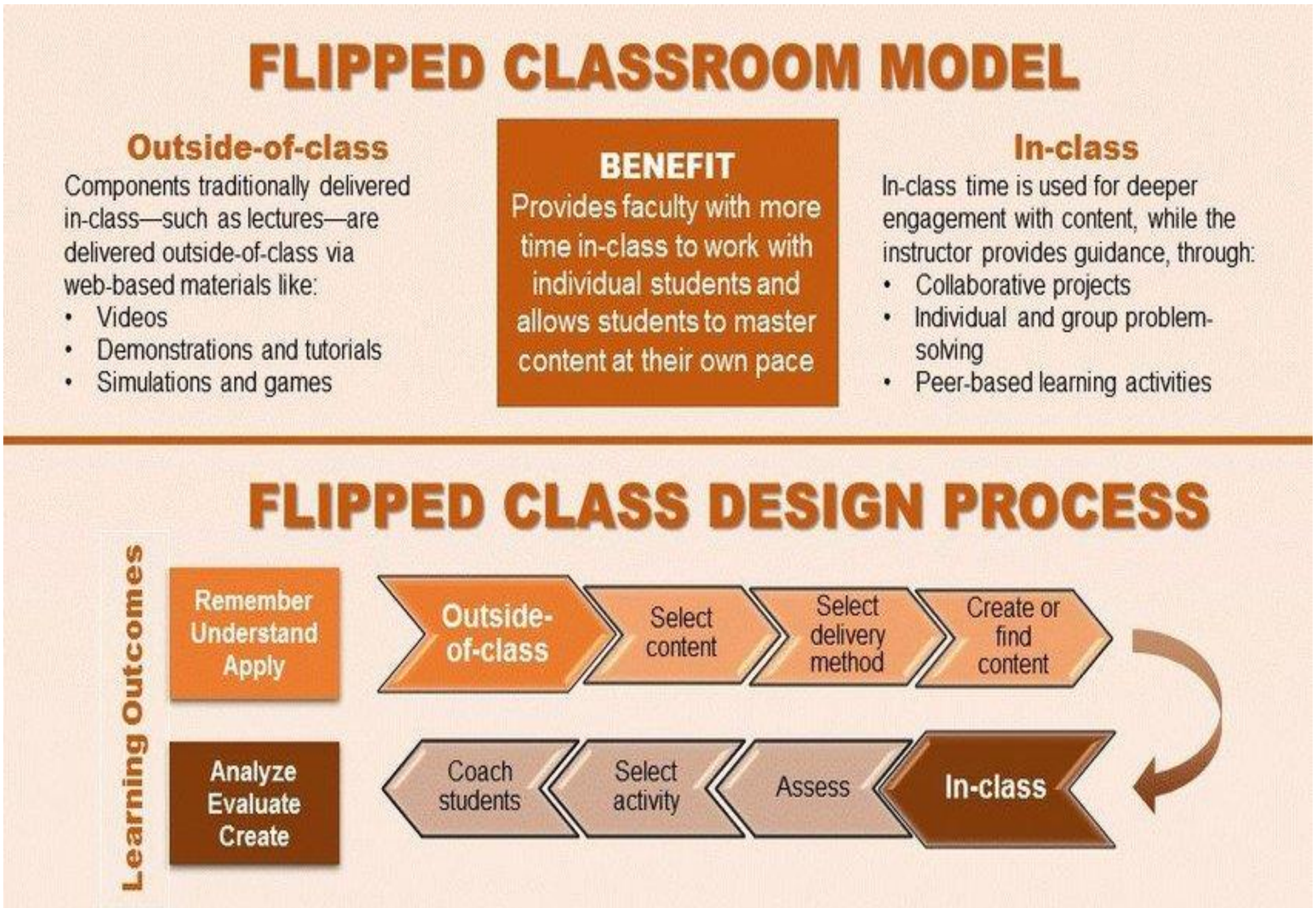

Figure 1. Flipped Classroom Model of teaching and Design Process

Characteristics of flipped classroom learning include students receiving new instructional content outside the classroom by watching online materials as homework, typically in the form of videos or podcast lectures, and then utilizing class time to engage in more challenging activities to assimilate knowledge, such as problem-solving, discussions, or debates (Brame, 2013; Danker, 2015: 172). In a flipped classroom, students can watch instructional videos on their computers, tablets, smartphones, or media players at their convenience and bring their knowledge from the homework to class, actively participating in the learning process (Yildirim, 2016: 2). Quoted from the University of Minnesota article in Subramaniam (2016: 4668), successful flipped classroom approaches possess three key characteristics. Firstly, the classroom environment is structured, meaning educators need to plan activities to keep students engaged with the lesson. Secondly, in-class activities need to be designed for students to solve problems, answer quizzes, and apply, or retrieve content they learned previously from the flipped video. Lastly, students are encouraged to be actively involved in learning through assessments, in-class activities, completing assignments outside of class, and attending face-to-face sessions. The following is the syntax for the flipped classroom model shown in Table 1.

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Table 1. Syntax of the Flipped Classroom Model

Stages	Learning Activities
Stage of Knowledge Delivery (before classroom learning)	1. Preparation of teaching materials: Educators prepare the materials and teaching resources. They organize their knowledge, create PowerPoint presentations, design and produce micro-videos, and upload videos to the e-learning platform. 2. Formation of study groups: Group discussions are formed, and participants are divided into several groups. 3. Presentation of videos and readings: Participants are asked to watch narrated micro-videos. Educators upload additional reading materials, including PowerPoint slides, textbook sections, self-study materials, and exercise information. 4. Learning guidance: Each group is required to prepare presentations before class. 5. Submission of assignments on e-learning: One day before each instructional unit, the group leaders upload assignments and exercises from group members to the e-learning platform, allowing educators to evaluate the effectiveness of self-learning.
Internalization of knowledge phase (in-class activities)	1. Educator feedback on student self-learning activities. The educator provides a brief overview highlighting key points from the instructional unit based on student tasks and feedback. This stage aims to address the main issues and confusion expressed during student self-learning. 2. Student presentation activities (Question and answer and intergroup discussions). The role of the educator shifts from being a leader to a coordinator, and in-class learning begins with an interactive learning model initiated by students between the educator and students. 3. Group-based learning exercises and problem-solving. During the presentation process, students in other groups are encouraged by the educator to interrupt the speaker or presenting group and ask questions. The educator offers an educator-student interaction session where students freely express their opinions on the presentation, and the educator briefly poses questions to each group regarding key points. 4. Educator's conclusion. The educator provides a review and simple summary, then assigns some exercises to all students.
Consolidation of Knowledge Phase (outside the classroom after learning)	1. Knowledge review. After the classroom session, students can use the e-learning platform to replay micro-lecture videos. Based on their competency levels, students can review the key points through online group discussions. 2. Online discussions between educators and students. During online discussions, students can discuss difficult points with the educator through the e-learning platform.

Student engagement is one of the expected abilities for every student at all levels. According to Ladd (in Reeve, 2012), student engagement is crucial in learning as it supports the smooth progress of the learning process. Research by Mustika & Kusdiyati (2015) and Kuh (in Trowler, 2010:4) suggests that students with high student engagement have a diligent habit when attending classroom learning, which ultimately leads to various measurable outcomes. This finding is supported by Hyde's study (2009), which indicates that students who participate in learning activities, particularly in the classroom, are more likely to perform well compared to those who do not engage in such activities. The extent to which students are involved in learning activities is closely related to high-quality learning outcomes (Krause, 2008:493). Student engagement can be seen as the effort devoted by

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students to directly contribute to desired outcomes as expected by the school (Hu, 2001:555). According to Guthrie (in Handlesman, 2005:184), engaged students are good learners, and effective teaching stimulates and supports student engagement. In conclusion, student engagement is the effort made by students to actively participate in effective learning activities to achieve high-quality learning outcomes. The engagement has several dimensions, as explained by experts. According to Skinner (1990:24), engagement includes the initiation of actions, efforts, and perseverance of children in their schoolwork, as well as the emotional state surrounding them during learning activities. Handelsman (2005:184) describes four factors that contribute to student engagement: skill engagement, emotional engagement, participation/interaction engagement, and performance engagement. Mosenthal (in Handelsman, 2005:185) bases engagement on students' cognitive and affective systems. Bloom (in Trowler, 2010:7) identifies three dimensions of student engagement:

a. Behavioral engagement: Students who are behaviorally engaged typically adhere to behavioral norms, such as attendance and active participation.

b. Emotional engagement: Emotionally engaged students do not exhibit destructive or negative behaviors. They experience emotional responses such as interest, enjoyment, or a sense of ownership (a desire to participate) during the learning process.

c. Cognitive engagement: Students who are cognitively engaged develop knowledge in their learning and strive to exceed competency demands while enjoying challenges.

The explanation about Student engagement indicator show in Table 2 below.

Table 2. Student Engagement Indicators

Factor	**Sub Factor**	**Indicator**	**Sub-indicator**
Affective Engagement	Learning enthusiasm	1. The students are very interested in and enjoy what they learn at school.	a. I feel happy when studying. b. I am enthusiastic about participating in learning.
ehavioral Engagement	Effort and endeavor in the classroom	1. Students strive hard to achieve success in school.	a. I follow all the instructions from the teacher. b. I strive to get good grades.
		2. Students participate in classroom activities.	a. I actively engage in discussion activities. b. I provide opinions/information during discussion activities.
		3. Students are focused during learning (their minds are not wandering).	a. Students participate and pay attention to the learning activities in class. b. Students take note of important points during the learning process.
		4. If they have difficulty understanding a problem, students repeat it until they comprehend it.	a. I study the problem to find the answer. b. I review videos and reference sources when I haven't found the answer yet.

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Cognitive engagement	Understanding and actualization of the material.	1. When learning new knowledge at school, students try to connect what they have learned with their own experiences.	a. I always relate knowledge from school to my own experiences. b. I compare new knowledge with my sources and experiences.
		2. When learning new information, students try to express ideas in their own words.	a. I always simplify new information so that it's easy to remember. b. I always combine information from various sources to gain a better understanding.

(Hart, 2011: 73)

The flipped classroom learning model is designed to be implemented by educators to facilitate the learning process in the classroom. It is used as an alternative teaching model that accommodates students with various issues, such as difficulty keeping up with fast-paced classroom lessons, absence during classroom instruction, and limited time for interaction and deepening knowledge with the teacher. Through the flipped classroom model, students can search for sources or references, both provided by the teacher and independently, before the classroom instruction. Students can build their knowledge extensively and identify problems that can be discussed in class. The more relaxed classroom time provides opportunities for intensive interaction between the teacher and students, fostering the exchange of ideas to find solutions. This ultimately leads to high student engagement in the learning process.

The integration of learning management system used in this class is CCR (CloudClassRoom). CloudClassRoom (CCR) was developed to transform the smart phone devices into powerful interactive learning management system. The CCR works on every device based on internet connection with 3G until 5G without further software or plug-in installation. The CCR operates across-platforms, likes iOS, Android, and Windows. The CCR enables students to respond with short texts, pictures, or even emoticons. The Students' can answers the question from teacher automatically in real time, and analyzed, providing the teacher with a rough picture of student learning progress just in time. It is expected that the results can inform researchers, teachers, and policy makers, of how to better leverage the potential of mobile technology to boost learning and teaching.

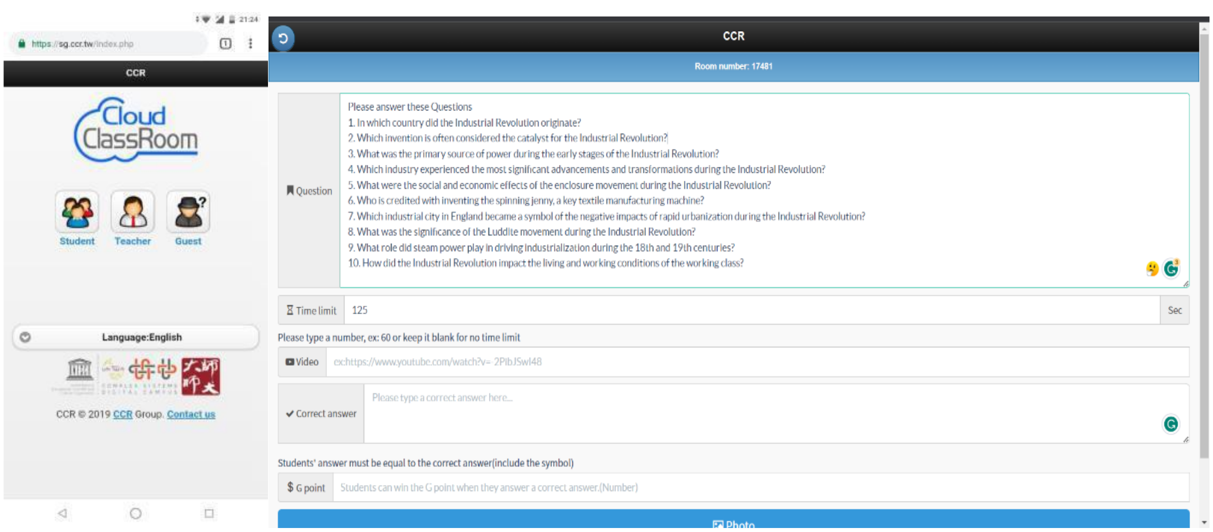

Figure 2. The interface of Cloud Classroom

The flipped classroom learning model is an innovation that provides a new reference for a beneficial shift in the learning process. It not only requires learning inside the classroom but also demands students to prepare the materials beforehand outside the classroom. The impact of this reversed learning pattern is creating face-to-face time in the classroom, leading to deeper interactions between educators and students because they are actively involved and engaged in discussions about specific issues (Danker, 2015: 174). The flipped classroom model also offers diverse options that can be utilized by students to deliver the materials. Starting from media selection (such as Edmodo, YouTube, e-learning platforms, etc.) for various at-home learning materials, to the flexibility of classroom time that can be utilized for different teaching sessions, aiming to achieve a higher level of learning engagement. Students nowadays can access knowledge and reach literacy sources anytime and anywhere instantly. Based on the above explanation, the utilization of new learning models as a tool for history learning needs to be implemented effectively so that students can engage in interactive learning. Therefore, the author is motivated to conduct research titled "The Influence of Flipped Classroom Learning Model on Student Engagement in History Learning for Grade XI Students of SMAN 1 Genteng."

II. Research Methods

A. Instrument test

1. Validity test

Content validity testing is a method used to determine the accuracy of learning test item grids. Content validation measures the extent to which a test can measure the substance of the material. The validity test takes the form of a test instrument that compares the correlation between the content of the instrument and the material being taught (Sugiyono, 2019:129). A test instrument is considered valid if it can measure the test items by correlating the item scores with the total score. If the calculated coefficient result is equal to or higher than the total number of items, the item is considered valid. However, if the result is the opposite, then the item is considered invalid.

The validity of the test items is tested using the Product Moment correlation supported by SPSS 23 for Windows. The correlation results are based on the r-table with a significance level of 0.05. If the correlation value of an item is greater than or equal to the r-table value, the item is considered valid. Conversely, if the correlation value of an item is smaller than the r-table value, the item is considered invalid.

2. Instrument reliability test

Reliability testing can serve as a standard to determine that an instrument is consistent in testing the same subjects and can produce consistent data (Bungin, 2015: 58). In this study, the reliability of the instrument is tested using the Cronbach's alpha technique because it is more suitable for multiple-choice questions. The software used for this purpose is SPSS for Windows.

Reliability testing aims to measure the level of accuracy and consistency of a test as a research instrument (Ary, et al., 2010). If the test items have a high-reliability value, then those items can be used as research instruments.

B. Prerequisite Analysis Test

In this study, the data analysis techniques used are the t-test and paired sample t-test. The obtained data can be analyzed using the t-test if they meet the prerequisites for analysis. The prerequisites for the analysis conducted are as follows:

1. Normality test

Normality test is a test conducted to assess the distribution of data in a data group or variable, whether the data distribution is normal or not. A normality test is useful to determine whether the collected data follows a normal distribution or is taken from a normal population. The normality test was performed on the learning outcomes test items in both experimental classes. The normality test calculation was conducted using the Kolmogorov-Smirnov test in SPSS for Windows.

2. Homogeneity test

A homogeneity test is a statistical test procedure aimed at demonstrating that two or more sample data groups taken are derived from populations that have equal variances. In other words, the homogeneity test is conducted to determine whether the data set under study have the same characteristics or not (Arikunto, 2013:363). The homogeneity test is performed to determine the similarity of score variances to test homogeneity. The researcher used the analysis of the test of homogeneity of variances with a significance value of 0.05 in SPSS.

C. Hypothesis Testing

T-test hypothesis testing is needed to test hypotheses. This testing is performed on the average values of the pretest and posttest in the experimental and control groups. Hypothesis testing in this study uses the paired sample t-test. The paired sample t-

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test is conducted to test hypotheses using the assistance of the SPSS program because the number of students in the control and experimental groups is the same. Before interpreting the results of the t-test using the SPSS program, there are certain things to consider, namely determining the variances of the two variables. Variances can be determined from the t-test results in SPSS for Windows, specifically in Levene's Test for Equality of Variances column. Levene's test functions to demonstrate the equality of variances between two variables. Variances are considered equal if the significance value (p) > 0.05, and they are considered unequal if the significance value (p) < 0.05 is in Levene's Test column. If Levene's Test column shows equality between the two variables, then the value in the t column is "equal variances assumed." However, if the variances are different, then in the t-test, the value in the coefficient row is "equal variances not assumed."

III. Results and Discussion

A. Results

1. Instrument Trial Results

The research instrument must undergo a pilot test, which includes validity and reliability testing. Both tests are used to ensure the accuracy and reliability of the instrument in capturing the competencies of the students to be tested. The subjects for the instrument test are 30 students each from the control group and the experimental group.

a. Validity test

Validity testing is a test conducted on a test instrument to determine the extent to which a measuring tool can measure a subject. According to Ghozali (2009: 20), validity testing is a determining test to assess the validity of an instrument. An instrument can be considered valid if it can express the intended information to be measured within that instrument. The data from the pilot test is subjected to bivariate correlation formula with the help of SPSS 25. Then, the test results are compared with the product-moment r-table using a significance level of 0.05. If the computed r-value is greater than the r-table value (30 objects = 0.361), then the data can be considered valid. However, if the computed R-value is less than the R-table value, then the data is considered invalid. Furthermore, the calculation results are interpreted based on the following criteria for instrument validity.

b. Reliability test

Reliability is a test used to determine the accuracy of an instrument so that the instrument can be trusted as a tool for gathering data that can reveal the true data (Ary et al., 2010; Rufaidah, Umamah & Sumardi, 2020). An instrument is said to be reliable if it is consistent and accurate when repeatedly tested. In other words, reliability indicates the consistency of a measuring instrument in measuring the same phenomenon. Reliability testing is calculated using Cronbach's alpha method with the assistance of SPSS 25. The following are the categories for assessing reliability coefficients.

Table 3. Reliability coefficient

Reliability coefficient	Reliability criteria
$0,80<r_{11}\leq 1,00$	Very high reliability
$0,60<r_{11}\leq 0,80$	High reliability
$0,40<r_{11}\leq 0,60$	Medium-high reliability
$0,20<r_{11}\leq 0,40$	Low reliability
$-1,00<r_{11}\leq 0,20$	Very low reliability

Guilford, (1956: 145)

Table 4. Results of the student engagement questionnaire reliability test

Reliability Statistics		
Cronbach's Alpha	N of Items	Information
0.925	16	Very high reliability

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The reliability test results in Tables 3 and 4 show Cronbach's alpha scores of 0.925 and 0.885, respectively. Referring to the reliability coefficient table, these data are considered to have very high reliability. Additionally, the score of 0.925 in Table 4 indicates high reliability. The conclusion drawn from these three reliability data is that the test items and questionnaires used in the study are deemed reliable and have good consistency in measuring the research subjects. Complete reliability test data can be found in the appendix.

B. Prerequisite Analysis Test

1. Normality test

The normality test is used to determine whether the data to be analyzed follows a normal distribution or not. The normality test is useful in determining whether the collected data is normally distributed or taken from a normal population. The data being analyzed includes learning outcomes and student engagement questionnaire results. The normality test is conducted using the Shapiro-Wilk test with the assistance of SPSS because the data consists of less than 50 subjects. The determination of distribution criteria uses a significance level of 0.05. If the significance value of the test result is greater than the alpha value of 0.05, then the data indicates a normal distribution. However, if the data has a significance value smaller than alpha, it indicates that the data is not normally distributed.

Table 5. Results of research data normality test

Class	Research variable		N	Sig	Information
Experiments	Student engagement	Pre	30	0,051	Normal distribution
		Post		0,120	Normal distribution
	Learning outcomes	Pre		0,170	Normal distribution
		Post		0,076	Normal distribution
Control	Student engagement	Pre	30	0,764	Normal distribution
		Post		0,788	Normal distribution
	Learning outcomes	Pre		0,057	Normal distribution
		Post		0,120	Normal distribution

Based on the Table 5 above, it can be seen that the student engagement questionnaire in the experimental class has a pretest score of 0.051 and a posttest score of 0.120. These scores have exceeded the significance value of 0.05 and are considered normally distributed. Furthermore, the learning outcomes research instrument in the experimental class has a pretest score of 0.170 and a posttest score of 0.076. These scores have exceeded the significance value of 0.05 and are considered normally distributed. The research instrument in the control class for the student engagement subject has a pretest score of 0.0764 and a posttest score of 0.788. These scores have exceeded the significance value of 0.05 and are considered normally distributed. Lastly, the research instrument in the control class for the learning outcomes subject has a pretest score of 0.057 and a posttest score of 0.120. These scores have exceeded the significance value of 0.05 and are considered normally distributed. Therefore, overall, all the data meets the criteria and is normally distributed.

2. Homogeneity test

A homogeneity test is conducted to determine whether the research sample data has the same or homogenous variance. In other words, a homogeneity test is conducted to determine whether the data set being studied has the same characteristics or not (Arikunto, 2013:363). The type of test used is Levene's statistic with the assistance of SPSS 25. The decision can be made based on the following criteria: if the significance value is greater than 0.05, then the sample is considered homogenous. Conversely, if the significance value is less than 0.05, then the sample is considered not homogenous.

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Table 6. Results of the research homogeneity test

Variable	Levene Statistic	N	sig	Information
Student engagement	0,025	30	0,874	Homogeneous variety
Learning outcomes	0,245	30	0,622	Homogeneous variety

Based on the data in the Table 6 above, it can be concluded that the pretest data for student engagement and learning outcomes have the same or homogenous variance. The obtained significance values are greater than the alpha value: student engagement sig = 0.874 > 0.05 and learning outcomes sig = 0.622 > 0.05. The homogeneity test data is available in the appendix.

C. Hypothesis Testing

1. Hypothesis test

Hypothesis testing is conducted to obtain answers to research questions. Hypothesis testing is part of inferential statistics that aims to conclude a population based on data obtained from a sample of the population. The purpose of hypothesis testing is to establish a basis for collecting evidence in the form of data to determine whether to reject or accept the truth of a statement or assumption that has been made. Hypothesis testing uses the paired sample t-test because it can have the same number of paired samples. The paired sample t-test tests for the presence or absence of a mean difference between the two paired samples. The paired sample t-test is conducted to determine the effect of flipped classrooms on student engagement and learning outcomes. The decision criteria for the paired sample t-test are as follows:

a. If the p-value (2-tailed) < 0.05, then H0 is rejected and Ha is accepted.

b. If the p-value (2-tailed) > 0.05, then H0 is accepted and Ha is rejected.

The results of the paired sample t-test on the effect of the flipped classroom learning model on student engagement, conducted using a questionnaire, can be seen in the following table:

Table 7. Results of the paired sample t-test in the experimental group using the questionnaire.

Paired Sample Test						
	Paired Differences			T	df	Sig (2-tailed)
	Mean - 16,6333	95% Confidence Interval of the Difference				
		Lower	Upper			
Pair Pretest-3 1 postest		-17,80796	-15,45871	-28,962	29	000

The Table 7 show that the sig (2-tailed) has a value of 0.000. Since the significance value is less than 0.05, H0 is rejected and H1 is accepted. Therefore, there is a significant influence of the flipped classroom learning model on student engagement.

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Table 8. Results of the paired sample t-test in the control group using the questionnaire.

Paired Sample Test						
	Paired Differences			T	df	Sig (2-tailed)
	Mean	95% Confidence Interval of the Difference				
		Lower	Upper			
Pair Pretest-3	-	-16,26296	-15,80371	-142,80	29	000
1 postest	16,0333					

The t-test in the control group resulted in a sig (2-tailed) value of 0.000 from Table 8 above. Since the significance value is less than 0.05, H0 is rejected and H1 is accepted. Therefore, there is a significant influence of the problem-based learning model on student engagement. However, when comparing the average increase in pretest and posttest scores between the two classes, there is a difference. The average score in the experimental class is 16.63, while in the control class, it is 16.03. Therefore, there is a difference of 0.6, indicating that students in the experimental class, with the implementation of the flipped classroom model, have a higher average compared to the control class with the implementation of the problem-based learning model.

Table 9. shows the results of the paired sample t-test in the experimental group with the learning outcome test.

Paired Sample Test						
	Paired Differences			T	df	Sig (2-tailed)
	Mean	95% Confidence Interval of the Difference				
		Lower	Upper			
Pair Pretest-3	-3,46667	-5,15586	-1,77747	-4,197	29	000
1 postest						

The table 9 above show the sig (2-tailed) value is 0.000. Since the significance value is less than 0.05, H0 is rejected and H1 is accepted. Therefore, there is a significant influence of the flipped classroom learning model on learning outcomes.

Table 10. shows the results of the paired sample t-test in the control group with the learning outcome test Paired Sample Test

Paired Sample Test						
	Paired Differences			T	df	Sig (2-tailed)
	Mean	95% Confidence Interval of the Difference				
		Lower	Upper			
Pair Pretest-3	-2,56667	-4,12545	-1,00788	-3,368	29	.002
1 postest						

The table 10 show the sig (2-tailed) value is 0.000. Since the significance value is less than 0.05, H0 is rejected and H1 is accepted. Therefore, there is a significant influence of the problem-based learning model on learning outcomes. However, when comparing the average increase in scores between the pretest and posttest in both classes, there is a difference. The average score in the experimental class is 3.46, while in the control class, it is 2.56. This indicates a difference of 0.9, showing that students who received the flipped classroom treatment in the experimental class have a higher average score compared to the control class with the problem-based learning treatment, based on the learning outcomes. The calculation of N-Gain aims to determine the pretest and posttest scores of the researched class. The results of the calculation can be seen in the following table.

Table 11. N-Gain test table for student engagement.

Number of students	Experiment Class	Control Class
Average value	30	30
Minimum value	57,71	47,94
Maximal value	32,14	15,63
	89,47	100

It can be seen on Table 11 that the N-Gain calculation results for the experimental class are higher than the control class. The average N-Gain score for student engagement using the flipped classroom model in the experimental class is 57.71 or 57.7%, which falls under the category of moderately effective, with a minimum score of 32.14% and a maximum score of 89.47%. Meanwhile, the average N-Gain score for student engagement using the problem-based learning model in the control class is 47.94 or 47%, which falls under the category of less effective, with a minimum score of 15.63% and a maximum score of 100%. Therefore, it can be concluded that the flipped classroom teaching model is sufficiently effective in improving student engagement in history learning for grade XI-MIPA at SMAN 1 Genteng for the academic year 2022/2023.

Table 12. N-Gain test table for learning outcomes.

Number of students	Experiment Class	Control Class
Average value	30	30
Minimum value	57,01	38,55
Maximal value	30	0
	100	100

It can be seen on Table 12 that the N-Gain calculation results for the experimental class are higher than the control class. The average N-Gain score for learning outcomes using the flipped classroom model in the experimental class is 57.01 or 57%, which falls under the category of moderately effective, with a minimum score of 30% and a maximum score of 100%. Meanwhile, the average N-Gain score for learning outcomes using the problem-based learning model in the control class is 38.55 or 38%, which falls under the category of less effective, with a minimum score of 0% and a maximum score of 100%. Therefore, it can be concluded that the flipped classroom teaching model is sufficiently effective in improving learning outcomes in history for grade XI-MIPA at SMAN 1 Genteng for the academic year 2022/2023.

It can be concluded that the N-Gain scores in the experimental class are higher than those in the control class for both the student engagement variable. The obtained scores of 57.71 for student engagement and 57.01 for learning outcomes fall into the category of moderately effective according to the coefficient values defined by Hake (1999), which can be found in subsection 3.8.2 of the N-Gain test. Therefore, it can be concluded that the flipped classroom teaching model is sufficiently effective in improving student engagement and learning outcomes in the 11th-grade science class.

Discussion

The improvement in student engagement, based on the processed data, is possible due to the influence of the flipped classroom teaching model, which provides convenience and more effective learning time. By flipping the class, a significant amount of class time can be used for knowledge delivery, and educators can engage with students through various learning activities such as discussions, problem-solving proposed by students, hands-on activities, and guidance (Gokce 2018:334). During face-to-face sessions with the teacher, learning can be filled with discussions. This leads to a more creative and active learning environment in the flipped classroom (Herreid & Schiller, 2013). The flipped classroom approach provides an opportunity for students to prepare themselves with foundational knowledge for in-class learning. This is in line with the opinions of Long (2017) and Gokce (2018:334) that learning content is not presented in the classroom but rather students study the basic knowledge of the subject matter before the meeting (through instructional videos), allowing class time to be used for interactive learning to provide student engagement opportunities. Students will participate in a more effective and active learning environment, which will make them enjoy the work they do (Yildirim 2016:5).

The syntax of the flipped classroom model includes (1) the pre-learning phase (watching instructional videos). Implementing the flipped classroom teaching model provides flexibility in students' learning, which can help them understand the required material. After testing the hypothesis through t-tests, a mean difference was found between the control group with the problem-based learning model and the experimental group with the flipped classroom model. This is influenced by the flexible syntax of the flipped classroom model in utilizing technology and efficient time management, allowing students to have ample time and resources to support their learning activities inside the classroom. This aligns with the opinions of experts, such as Herried and Schiller (2013:62), who state that the flipped classroom model supports a new approach to utilizing technology suitable for 21st-century learning. Meanwhile, in the control group with the problem-based learning model, some students lack sufficient preparation for learning. This is in line with the opinion of Sanjaya (2007:219), stating that problem-based learning requires a long time to implement. This is because the entire process of preparation, learning, and evaluation takes place simultaneously during classroom instruction. Learning with a single-time activity process requires sufficient time allocation to ensure effective implementation. However, in SMAN 1 Genteng, the allocated time for one learning session is limited to 2x45 minutes. The lack of sufficient student preparation requires educators to provide extra guidance in directing the learning process to ensure completion within the given time allocation. Previous research by Danker (2015) demonstrated that flipped classrooms yield positive outcomes, particularly in terms of student participation in lessons. Students have shown that they are engaged in their learning, with some even applying what they have learned in their own assignments and daily lives. Similarly, a study by Castedo (2018) also produced similar results, indicating that the flipped classroom model has a direct impact on student learning outcomes, especially for highly engaged students. Additionally, research by Zahrani (2015) showed that the flipped classroom approach can enhance student engagement and creativity, particularly concerning smooth learning, flexibility, and innovative models. However, it is important to note that students must be prepared to take advantage of the flipped classroom and be equipped with adequate e-learning tools. The e-learning as learning management system namely CloudClassroom which used in this research also give the significant impact in learning activities to facilitate the online interaction between teacher and student as part of model flipped classroom. In conclusion, the flipped classroom model is considered effective in enhancing student engagement in history learning for Grade XI-MIPA students at SMAN 1 Genteng in the academic year 2022/2023.

Based on the data obtained, both flipped classrooms and problem-based learning have a significant influence on student learning outcomes. However, the implementation of the flipped classroom model helps students to learn better according to their learning styles. Students can access learning resources provided by educators (instructional videos, modules, links, etc.) as well as other references they find. The use of the flipped classroom model also enhances student learning outcomes. This is influenced by the flexibility of the flipped classroom syntax, which can be adapted to the needs of the class. Flipped classroom allows students to learn at their own pace, pausing videos to take notes and process information. This active participation in the learning environment leads to students enjoying the subjects being taught (Bergmann and Sams, 2012; Yildirim, 2016:5). Additionally, by completing classwork at home, students have more free time in class to comfortably ask questions about topics they don't understand, and educators can provide tailored solutions based on students' abilities (Herreid and Schiller, 2013:62). Based on the data analysis and previous studies, it can be concluded that the flipped classroom learning model is effective in improving learning outcomes in history education for grade XI-MIPA students at SMAN 1 Genteng in the academic year 2022/2023.

IV. Concluding Remarks

Through the flipped classroom model, students can search for sources or references, both from teacher-provided materials and independently, before the in-class learning session. Students can build their knowledge comprehensively and identify issues before the lesson that can be discussed in class. The more flexible classroom time allows educators to interact intensively and exchange ideas to find solutions, resulting in high student engagement in the learning process. The flipped classroom learning model is an innovation that provides a valuable reference for changing the learning process, which not only requires learning inside the classroom but also demands students to prepare the material beforehand outside the classroom. The flipped classroom learning model also offers various options that can be utilized by students to deliver the content. Starting from selecting media (such as Edmodo, YouTube, e-learning platforms, etc.) for students' at-home learning materials, to the flexibility of classroom time that can be used for various teaching sessions, thereby achieving a deeper level of learning engagement. The author would like to express sincere gratitude to all parties who have contributed and provided constructive input and suggestions, which have greatly contributed to the improvement of this article.

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