

Original Article

Application of Blended Learning in Physical Education Learning for Students' Critical Thinking in High Schools

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Abstract

Introduction: Students' critical thinking skills must be improved even though during the Covid-19 pandemic, learning is done at home. They have a blended learning model as an alternative learning model that can be applied in schools during the Covid-19 pandemic. **Purpose:** This study aims to determine the effect of applying the blended learning model in physical education learning on the critical thinking of high school class students. This research was conducted in one of the senior high schools in the city of Bandung. **Methods:** Applying a quantitative descriptive approach with a survey method. The total population used is 249, with a sample of 156 respondents. The sampling technique used is simple random sampling. The instrument used is a Questionnaire Physical Activity Questionnaire for Adolescents, which adopts from previous research that has been tested for validity with a value of -0.010 - 0.0506 and reliability of 0.682 - 0.745 so that it is declared valid and reliable, used to measure physical strength activity according to by age and distributed via Google Form with data analysis techniques assisted by Microsoft Excel. **Results:** The research method used in this study was an actual experiment. By cluster random sampling, two research groups were selected in class XI, divided into two, namely the experimental group and the control group, which both amounted to 35 people—a total of 16 meetings. The experimental and control groups received treatment, the experimental groups received the blended learning model treatment, and the control group received the conventional learning model treatment. Instruments were given to pretest and posttest. In this study, the instrument to measure students' critical thinking skills was adopted from the Watson-Glaser Critical Thinking Appraisal, which consists of five components including 1) inference, 2) recognition of assumptions, 3) deduction, 4) interpretation, and 5) evaluation of arguments. **Conclusions:** The results of data analysis using the SPSS version 28 test paired sample t-test obtained a p-value of the experimental group of $0.000 < 0.05$, which means that the blended learning model can significantly improve students' critical thinking, while the p-value in the control group is $0.000 < 0.05$ which means that the application of conventional learning models has a significant effect on increasing students' critical thinking skills. The results of the independent sample T-test showed that the p-value = $0.000 < 0.05$, which means that there is a significant difference in the average between the experimental group and the control group, with the difference in the post-test average value of the experimental being 16.75 more significant than the control group. Blended learning has a more significant effect on improving students' critical thinking skills than conventional learning models. A blended learning model can be applied to improve one of the life skills in the 21st century, namely critical thinking for high school students.

KeyWords: *Blended Learning, Critical Thinking, Physical Education, Online Learning*

Introduction

The Covid-19 pandemic has caused a shift in schools' learning process, which is usually done face-to-face, now has to adapt to online learning (Espino-Díaz et al., 2020). This forces teachers and students to adapt to circumstances so that the learning process can continue despite the limitations of this pandemic

condition (Batubara, 2021). Judging from the implementation, the online learning approach is divided into 2, namely synchronous and asynchronous (Rasmitadila et al., 2020). Synchronous learning is direct and real-time using direct face-to-face media such as google meet, zoom meeting, and so on (Simamora, 2020). Meanwhile, asynchronous learning can be done flexibly without having to meet face to face in life and in real-time using a learning management system (LMS) such as Google Classroom, Moodle, and so on (Tolosa et al., 2015). Teachers can apply one or both of these online learning approaches to achieve learning goals (Brinthaup & Fisher, 2011). If the teacher applies the two online approaches in the implementation of learning, namely synchronous and asynchronous, then the teacher has implemented blended learning (Li et al., 2020).

The blended learning model can be applied to all subjects in schools, including physical education learning to achieve learning objectives which are classified into three domains, namely: 1) Cognitive domain, 2) Affective domain, and 3) Psychomotor domain (Tang et al., 2020). In addition to these three domains, physical education learning in schools must improve the 21st-century competencies of students, including; creative thinking skills, critical thinking and problem solving, communication, and collaboration (Kim et al., 2019). In addition, of course, with the limitations during the COVID-19 pandemic, the author sees critical thinking as one of the most important things to improve for students considering that this time is an era of disruption that forces us to be able to adapt to all changes (Dhawan, 2020).

Several studies on the application of learning models to improve students' critical thinking skills have been carried out, including; the application of the inquiry learning model with scientific literacy on the topic of chemical kinetics has been proven to improve students' critical thinking skills (Sutiani et al., 2021). Implementing the jigsaw collaboration model and problem-based learning effectively develops the critical thinking skills of class XI accounting students (Saputra et al., 2019). Problem-based learning (PBL) and Predict, observe, explain (POE), which can also be called PBLPOE, have an effect on increasing students' critical thinking skills and students' scientific attitudes toward biology subjects (Fitriani et al., 2020). The application of the Critical Inquiry-Based Learning learning model development can improve the critical thinking skills of pre-service teachers (Prayogi et al., 2018). The application of the discovery learning model with the development of learning tools (syllabus, lesson plans, and LKPD) on the side-plane material in grade VIII junior high school has been proven to improve students' mathematical critical thinking skills (Putri et al., 2020). In addition, the application of blended learning model-based chemistry learning tools can improve the critical thinking skills of high school students in class X (Hadisaputra et al., 2020). However, from several previous research results to improve students' critical thinking skills, no one has applied the blended learning model in the context of learning physical education.

This research relates to applying the blended learning model in physical education learning to students' critical thinking skills in high school class XI. Although research is still very low on the application of blended learning models in physical education learning in schools on students' critical thinking skills, they do not realize that asynchronous it is almost the same as the inquiry process in which students are forced independently to be able to understand the content of the tasks given. On the LMS, they must complete it in a limited time (Nygaard et al., 2008). Therefore, the author has a hypothesis that applying the blended learning model can improve students' critical thinking skills.

Material & methods

The research method used in this study was an actual experiment, with a pretest-posttest research design with a control group design. This study has two groups, namely the experimental group and the control group. The experimental group received the blended learning model treatment, while the control group received the conventional learning model treatment. Before and after being given treatment, both groups filled out the critical thinking ability instrument, which was distributed via a google form.

Participants

The participants in this study were students of class XI high school in Bandung, West Java, Indonesia. 2 classes out of a total of 9 classes were selected by cluster random sampling to be the research group. In this study, each class had the same opportunity to become participants. The results of cluster random sampling showed that class D and class G were selected to be the research group, then determining the experimental

group and the control group was done randomly. The random results selected class D as the experimental group and class G as the control group. The number of students in each class is 35 people. Before the research was carried out, all students filled out an approval form that students and their parents/guardians must fill out. From the form that has been filled in, all students are willing and allowed by their parents to be participants in this study.

Procedure

Treatment in this study was carried out for 16 weeks with the implementation of learning carried out once a week with a duration of one meeting of 3 X 45 minutes. Before being given treatment, both groups were given an instrument to measure critical thinking skills via a google form. Likewise, after the treatment was finished, the two groups returned to fill in the same instrument through the google form. The experimental group received the blended learning model treatment in which students had to join synchronously through zoom meetings and asynchronously through google classroom. At the same time, the control group received the conventional learning model treatment, which was carried out directly through a zoom meeting.

Instruments

The instrument used in this study refers to the Watson-Glaser Critical Thinking Appraisal, which consists of five components; 1) inference, 2) recognition of assumptions, 3) deduction, 4) interpretation, and 5) evaluation of arguments. Before the instrument is given, it is first translated by a linguist, and the instrument reliability test is carried out. After testing the instrument on 100 class XI participants in different schools and after calculating using Cronbach's alpha, the reliability value was 0.92.

Statistical Analysis

The data processing in this study used the SPSS version 28 application. The data analysis technique used in this study was to use the paired sample T-test to determine the significant effect of the learning model on the pre-test and post-test results of students' critical thinking skills, then to determine the difference in average the average of the experimental group and the control group using the independent sample T-test.

Results

Based on the pretest data, the demographic data of the participants in the experimental group are presented in tabel 1. The experimental group consisted of 35 students with a male sex distribution of 16 people and 19 women, with an average height of 159.51 cm. with a minimum height of 147 cm and a maximum of 173 cm. an average body weight is 52.97 kg with a minimum weight of 47 kg and a maximum weight of 60. The average BMI is 20.88, with a minimum BMI of 18.08 and a maximum BMI of 24.35.

Tabel 1. Eksperimental Group Demographics

	N	Min	Max	Mean	Std. Deviation
Group	35	1	1	1.00	.000
Gender	35	16	19	1.54	.505
Height	35	149	173	159.51	6.657
Body Weight	35	47	60	52.97	3.148
BMI	35	18.04	24.35	20.8771	1.59529
Valid N (listwise)	35				

Demographic data for the control group are presented in tabel 2. The number of participants in the control group was 35 people, with a male sex distribution of 15 people, while 20 people were female. The average height was 157 cm with a minimum height of 151 cm and a height of 151 cm. maximum bodyweight is 171. The average body weight is 55.91 kg, with a minimum body weight of 48 kg and a maximum weight of 70. The average BMI is 21.72, with a minimum BMI of 19.03 and a maximum BMI of 25.71.

Tabel 2. Control Group Demographics

	N	Min	Max	Mean	Std. Deviation
Group	35	1	1	1.00	.000
Gender	35	15	20	1.57	.502
Height	35	151	171	160.54	6.050
Body Weight	35	48	70	55.91	4.847
BMI	35	19.03	25.71	21.7163	1.77926
Valid N (listwise)	35				

Tabel 3, the results of the paired sample T-test show a significant number between the pretest and post-test scores with a significance value (2-tailed) $p = 0.000 < 0.05$, which means that the blended learning model has a significant effect on improving students' critical thinking skills.

Tabel 3. Experimental Group Paired T-test

Tests	n	Descriptive Statistic		Paired T-Test	
		M (std. D)	t	df	Sig (2-tailed)
Pre-test	35	74.37	-44.96	34	0.000
Post-test	35	96.29			

Tabel 4, the results of the paired sample T-test show a significant number between the pretest and post-test scores with a significance value (2-tailed) $p = 0.000 < 0.05$, which means that conventional learning models have a significant effect on improving students' critical thinking skills.

Tabel 4. Control Group Paired T-test

Tests	n	Descriptive Statistic		Paired T-Test	
		M (std. D)	t	df	Sig (2-tailed)
Pre-test	35	74.00	-17.86	34	0.000
Post-test	35	79.54			

Tabel 5, the results of the independent sample T-test, obtained sig. (2-tailed) of $0.000 < 0.05$, it can be concluded that there is a difference in the average critical thinking ability of students between the blended learning model and the conventional learning model. If it is seen from the post-test average value of the experimental group's critical thinking ability in table 3 is 96.29, and the post-test average value of the control group's critical thinking ability in table 4 is 79.54 then there is a difference in the average post-test score of the experimental group which is 16.75 greater than the group. Control, then the blended learning model is more influential in improving students' critical thinking skills than conventional learning models.

Tabel 5. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Significance Difference (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Critical Thinking	Equal variances assumed	3.086	<.001	38.955	68	.000	16.74286	.42980	15.88520	17.60051
	Equal variances not assumed			38.955	49.487	.000	16.74286	.42980	15.87935	17.60636

Discussion

This study aimed to determine the application of the blended learning model in physical education learning to students' critical thinking skills. This study used a pretest and posttest with a control group design that compared two research groups that received blended learning model treatment with conventional learning models. The findings show that the experimental group is statistically more influential in improving students' critical thinking skills than the control group (see table 5). The results of this study follow the results of research from (Hasanah Hasanah, 2020), who applied blended learning in entrepreneurship courses in the Electrical Engineering Education department, which resulted in students' critical thinking skills and communication skills in the experimental class having significantly different compared to the control class. Others apply the blended learning model to effectively improve students' critical thinking skills and knowledge transformation (Jou et al., 2016). In addition, the application of the blended learning-based inquiry model can improve students' critical thinking skills on optical material in physics learning (Zain & Jumadi, 2018). Finally, applying the blended learning model in geography courses can increase students' critical thinking skills (Korkmaz & Karakus, 2009). Several applications of the blended learning model in non-physical education learning can improve students' critical thinking skills.

Meanwhile, several research results on the application of the blended learning model in improving students' thinking skills show results that are in line with the findings in this study, including; the application of the blended learning model in physical education subjects with athletic material by developing four series of learning activities using a learning management system, learning activity management system, which is operated in an integrated manner with Moodle. Statistical data of the blended learning model has a significant effect on students' critical thinking compared to traditional learning models. (George & Spyros, 2016). In addition, the application of the blended learning model using the Frog Virtual Learning Environment (VLE) platform on student achievement in Teaching Games For Understanding (TGfU) in handball games at secondary schools in Malaysia shows that the blended learning approach can improve students' understanding, knowledge, and skills. About the game of handball, the research results obtained by students have achieved an increase in performance in strategy and tactical understanding in solving game problems and making decisions during handball games (Jani et al., 2018). In other words, the results of the study stated that increased performance in strategy and tactical understanding in solving game problems and making decisions during handball games are part of critical thinking, so it can also be said that students' critical thinking skills increase even though their critical thinking skills are not directly measured.

From several research results on the application of the blended learning model in physical education or non-physical education, the results are in line with this research. Namely, applying the blended learning model can improve students' critical thinking skills. When viewed from the learning process in blended learning, there is an asynchronous learning process in which students unconsciously carry out an inquiry process such as observing, experimenting, classifying, developing hypotheses, drawing conclusions, designing, planning in completing the tasks given by the teacher, whether it is a motion task or a task. Answer the practice questions given in the LMS.

Conclusions

Applying blended and conventional learning models in physical education learning in high school class XI can significantly improve students' critical thinking skills. However, the application of the blended learning model in physical education learning has a more significant effect than the conventional learning model in improving the critical thinking skills of high school students in class XI.

Conflicts of interest . The authors have no conflicts of interest with the content of this review.

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