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THE EFFECT OF FLIPPED CLASSROOM BASED ON DISASTER MAP VISUALIZATION IN DISASTER MITIGATION LEARNING ON STUDENTS' SELF-EFFICACY AND CRITICAL THINKING SKILLS

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ABSTRACT

Disaster mitigation material in geography learning requires not only critical thinking skills but also independence and optimism from students. In this regard, the effective approach needed relies not only on theory but also on practice in independent assignments and exercises. It makes limited face-to-face learning, which has been applied recently, unable to optimize learning outcomes. This study aims to analyze the impact of flipped classroom learning based on disaster map visualization on students' self-efficacy and critical thinking skills in disaster mitigation materials. The study used a quasi-experimental design with a pretest-posttest control group design. The research sample consisted of the experimental class (30 students) and the control class (30 students), which were determined randomly after the equivalence test. Data on critical thinking skills were collected using a test method in 10 description items, and self-efficacy data were collected using a questionnaire consisting of 30 statements. The data were analyzed using quantitative descriptive and inferential statistical analysis with MANOVA. The results show a significant effect simultaneously or partially with the sig value. <0.05, so it can be concluded that there is an effect of flipped classroom learning based on disaster map visualization on students' self-efficacy and critical thinking skills in disaster mitigation materials.

Keywords: critical thinking skills; disaster mitigation; flipped classroom; limited face-to-face learning; self-efficacy

INTRODUCTION

Indonesia is located on three active plates (Eurasian, Indo-Australian, and Pacific), classified as a disaster-prone area. In this regard, the simplest thing that can be done is to educate on disaster mitigation through education or an effort to empower the community as part of a culture of preparedness for natural disaster mitigation (Johan et al., 2021). The material provided includes (1) terms in disaster, (2) types of natural disasters, (3) understanding of disaster mitigation, (4) disaster mitigation efforts, and (5) community participation in disaster mitigation through preparedness, vigilance, and various capacities to cope with disasters (Akbar & Hartono, 2017). Disaster mitigation learning provides students' knowledge, experience, and skills about disasters and builds a strategy that can be used to overcome disasters (Oktaviantika, 2017; Febrianto et al., 2021). This regard takes the students' skills to manage knowledge in-depth, analyze, evaluate, and design a strategy relevant to disaster problems. Taking into account what these expectations are, critical thinking skills are needed in this learning.

Critical thinking skills are the ability to analyze facts, convey ideas, defend opinions, make comparisons, draw conclusions and evaluate the arguments given, and the ability to solve problems (Pramestika et al., 2020; Rati & Rediani, 2020). Critical thinking is one's cognitive skill to state something with confidence because it is based on logical reasons and substantial evidence (Meilana et al., 2020) and related to the students'

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skill to deal with everyday problems (Odebiyi & Odebiyi, 2021) by providing opportunities for students to use information sources to generate solutions and build relationships (Polat & Aydın, 2020). Critical thinking skill is one of the important learning outcomes in education (Hart et al., 2021; Yu et al., 2021; Pramesti et al., 2022), so innovative learning is needed to develop students' critical thinking skills (Seibert, 2020; Silberman et al., 2021). These skills are very much required in teaching disaster mitigation materials. However, good self-efficacy must also be balanced in realizing good critical thinking skills.

Self-efficacy is one's optimism about his skills so that it is directly proportional to his abilities and skills to face challenges and obstacles (Permana et al., 2017; Li et al., 2020). Self-efficacy in learning has been proven to be able to realize learning objectives (Evens et al., 2013), determine the choice of behavior or activity that is believed to be capable of doing (Iskandar et al., 2020), and have an impact on learning motivation (Hyytinen et al., 2018; Huang et al., 2020), and better students' performance (Huerta et al., 2015; Qiu & Lee, 2020). It means that self-efficacy will develop well if students have self-confidence, and learning outcomes can be improved by reducing anxiety and increasing self-efficacy (Huang & Mayer, 2019). Learning that is more collaborative, autonomous, and less demanding of students is needed to develop self-efficacy in learning (Zwart et al., 2020).

Based on this description, it can be said that high self-efficacy will impact students' performance in the teaching and learning process and is very much needed in disaster mitigation learning. The importance of students' critical thinking skills and self-efficacy in learning disaster mitigation requires educators to use learning models that are more independent of students. In reality, current conditions with social restrictions changed face-to-face learning to online learning (Mishra et al., 2020; Oyedotun, 2020; Patricia, 2020; Sahu, 2020). Online learning with specific platforms, as stated by Chang et al. (2020), Hwang et al. (2020), Kkese (2020), Lage-Cala et al. (2020), and Andel et al. (2020), indeed provides opportunities for students to learn more independently and learn more flexibly without any space and time limits through the use of technology in helping interactions occur even online. However, online learning must also pay attention to the financial condition of students as well as the facilities and infrastructure that support their learning (Rusli et al., 2020; Widikasih et al., 2021). In addition, online learning has weaknesses, including disrupting social and emotional development, lack of social interaction, and endangering health and growth (Edwards et al., 2012; O'Doherty et al., 2018). Some students who are not accustomed to using smartphones and computers in the learning process show decreased interest in learning, and they pay less attention during online learning. These weaknesses cause learning outcomes to be less optimal (Mishra et al., 2020).

Realizing that online learning outcomes are not optimal, the government decided to conduct limited face-to-face learning. The implementation of limited face-to-face learning in schools still applies health protocols, limits the number of students in one class, and has a limited learning time duration. It causes learning to be less effective considering the unpreparedness of students in participating in learning. If this is allowed, the demands of 21st-century learning with its 4Cs will not be realized. Optimizing limited face-to-face learning requires an appropriate learning model to overcome these limitations. One method that can be used is the flipped classroom, an alternative approach to collaborating between face-to-face learning and learning at home. Students will work on assignments that have been prepared by the teacher at home and will be clarified at face-to-face meetings (Hassan & Othman, 2021).

The flipped classroom is learning that makes students learn independently because they have studied at home first about the topics to be studied before meeting with the teacher and for problem-solving exercises (Dombrowski et al., 2018; Oktarina et al., 2021). Flipped classroom creates a learning environment that is technology-driven and student-centered at the same time (Leanna & Petra, 2021; Wikanda et al., 2021), thereby encouraging learning and practice according to individual pace and schedule (Cheng et al., 2017). In addition, this learning will also encourage students to watch videos, read materials, and do assignments according to their own time by forming the concept of learning done at home (Suryawan et al., 2021).

Several studies show the success of the flipped classroom. Lubbe (2016) and Chick et al. (2021), in their research, found that in addition to improving performance, students preferred to follow the flipped classroom, and it was stated that it had a positive effect on students' understanding of mathematical concepts. (Juniantari et al., 2019). Research by Lu et al. (2021) revealed that Edmodo and the flipped classroom were suitable for training students in improving digital literacy, working collaboratively, and controlling the learning process independently. This learning can also

be well received by students and can complement traditional learning methods (Erdemir & Yangın Ekşi, 2019) and can achieve academic results at a higher level (Palazón-Herrera & Soria-Vílchez, 2021). Research by Vermana and Zuzano (2018) revealed that applying the flipped classroom with the GQGA active learning strategy can improve students' learning outcomes. Purba (2021) showed that the flipped classroom increased learning activities that had a positive impact on the value and quality of individual learning activities

Based on these explanations, it can be stated that, with a flipped classroom, the learning process will be preferred by students so that face-to-face learning with a limited time duration makes learning activities more effective. This advantage is why this learning is used as a solution in limited face-to-face learning. However, this research is different from the existing ones. This flipped classroom learning will be applied to limited face-to-face learning to teach disaster mitigation materials. This material was chosen because it requires high-level thinking skills and good self-efficacy to master it to realize the expected learning objectives. In addition, Indonesia is a disaster-prone country. Through disaster mitigation learning, students have the skills and knowledge about disasters and their mitigation to recognize disaster-prone conditions in their homeland and improve preparedness in dealing with disasters. In this regard, in teaching disaster mitigation material, it is necessary to conduct an assessment related to the application of flipped classroom learning based on disaster map visualization in limited face-to-face learning to increase students' self-efficacy and critical thinking skills. This study aims to analyze the impact of flipped classroom learning based on disaster map visualization on students' self-efficacy and critical thinking skills in disaster mitigation materials.

METHODS

This study used a quasi-experimental design with a pretest-posttest control group design (Rogers & Revesz, 2019), which involved the experimental and control groups. The experimental group was given treatment in flipped classroom learning based on disaster maps visualization. This learning combines limited face-to-face learning with learning at home in exercises and assignments to add broader insight to students related to disaster mitigation materials, while the control class is not given treatment. Pretest was given to both groups to determine the initial conditions before treatment. Posttest was given to determine differences in self-efficacy and critical thinking skills between the experimental and control groups. The data needed in this study consisted of (1) self-efficacy (Y_1) before treatment in the experiment group; (2) self-efficacy (Y_1) before treatment in the control group; (3) critical thinking skills (Y_2) before treatment in the experiment group; (4) critical thinking skills (Y_2) before treatment in the control group; (5) self-efficacy (Y_1) of students taught using flipped classroom learning based on disaster map visualization; (6) self-efficacy (Y_1) of students taught by limited face-to-face learning; (7) critical thinking skills (Y_2) of students taught using flipped classroom learning based on disaster map visualization; and (8) critical thinking skills (Y_2) of students taught using limited face-to-face learning.

Table 1. Indicators of Critical Thinking Skills in Disaster Mitigation

No	Basic Competencies	Indicator	Cognitive Level	Number of Questions
(1)	(2)	(3)	(4)	(5)
1	Analyzing the types and management of natural disasters through education, local wisdom, and the use of modern technology	Differentiating the types of natural disasters in Indonesia	C4	2
		Diagnosing the types of natural disasters in Indonesia	C4	2
		Deciding on natural disaster management through education of local wisdom and the use of modern technology	C5	2
2	Make a sketch, floor plan, and/or map of the local area's potential disaster and disaster mitigation strategy based on the map	Planning a sketch/map of the local area's potential disaster	C6	2
		Designing a disaster mitigation strategy based on the map that is made	C6	2

The trial was conducted at the Undiksha Laboratory High School by taking Class XII IIS_1 as the experimental group and Class XII IIS_2 as the control group, which was determined randomly after an equivalence test was conducted using One Way-ANOVA (Anava-A) analysis with the SPSS 26.0 for Windows application. Data collection used the test method to measure students' critical thinking skills. The test was developed according to the disaster mitigation material in 10 essay questions at levels C4 - C6 with the following steps: (1) create a test instrument outline, (2) make questions in essays, (3) consult the developed outline and questions to the experts.

Several tests were conducted to ensure the validity and reliability of the test instrument of critical thinking skills. Item validity test used the CVR formula with the calculation results of each instrument item is 1. The total CVR of all items of the critical thinking skills test instrument is 10, so it is declared valid based on the provisions of the validity of the instrument item. The content validity test of the critical thinking skills test instrument was carried out using the CVI formula with a score of 1 so that it was classified as very good based on the content validity provisions of the entire instrument in the CVI formula. The reliability test of the critical thinking skills test with data in polytomies using the Alpha Coefficient formula with the results obtained is 0.85 and is in the range of 0.60 < r11 0.85. So, the reliability of the critical thinking skills test is in high criteria. The level of difficulty of critical thinking skills test items, of the ten questions made, three are on the medium criteria, and seven are on the high criteria. Meanwhile, the level of difficulty of a test device is in the difficult criteria.

The method of collecting data to measure self-efficacy using a closed questionnaire refers to the Likert model rating scale with four answer options: Very Appropriate (VA), Appropriate (A), Inappropriate (I), Very Inappropriate (VI). The questionnaire was developed from the dimensions of efficacy according to Badura: (1) the magnitude dimension, (2) the generality dimension, and (3) the strength dimension (Bandura, 1997). These three dimensions are developed into nine indicators broken down into 30 statements. Pay attention to Table 2.

Table 2. Dimensions, Indicators, and Number of Self-efficacy Statements for Disaster Mitigation

No	Dimension	Indicator	Number of Statements
(1)	(2)	(3)	(4)
1	Magnitude	1) Self-efficacy in completing disaster mitigation tasks	3
		2) Self-efficacy in problem-solving related to disaster mitigation	4
		3) Self-efficacy in overcoming challenges	3
2	Generality	1) Self-efficacy in one's ability to deal with certain conditions related to disaster mitigation	4
		2) Self-efficacy in one's ability to face more difficult conditions	3
3	Strength	1) Self-restraint in completing disaster mitigation tasks	4
		2) Self-tenacity in completing disaster mitigation tasks	3
		3) Strong willingness to face the disaster mitigation problems	3
		4) Determination in dealing with disaster mitigation tasks and problems	3
		Total	30

Source: (Bandura, 1997)

Several tests were conducted to ensure the validity and reliability of the self-efficacy questionnaire. The content validity test used the CVR formula. From the calculation results, each instrument item is 1, and the total CVR of all self-efficacy instrument items is 30 so that it is declared valid. Content validity test results obtained 0.773, and this value is classified as very strong. The reliability test got Cronbach's Alpha value of 0.833, meaning that the developed questionnaire is very reliable.

Data analysis in this study used two analyses. Descriptive analysis of pretest and posttest data was processed using SPSS 25.0 for Windows to obtain the mean, standard deviation, and maximum and minimum values. Inferential analysis used two methods: t-test for pretest data and MANOVA test for posttest data. Before the t-test, the prerequisite tests for normality (Kolmogorov-Smirnov) and homogeneity (Levene Statistics) were performed. Likewise, with the MANOVA test, prerequisite tests were first carried out with

the help of SPSS 25.0 for Windows: normality test (Kolmogorov-Smirnov), homogeneity test (Levine's Statistic and Box's Test of Equality of Covariance Matrices), and linearity test to determine whether there is a linear relationship on each dependent variable analyzed.

RESULTS AND DISCUSSION

After the students were taught disaster mitigation materials according to the learning design made in the limited face-to-face learning with the flipped classroom, the descriptive analysis results showed a significant effect on the learning application.

The results of the descriptive analysis show that there are differences in students' self-efficacy and critical thinking skills between the that applied flipped classroom learning based on disaster map visualization and the class that did not. The difference is shown from self-efficacy scores of 4.00, with the average score of the class with flipped classroom learning based on disaster map visualization being greater than that without flipped classroom learning. In critical thinking skills, the difference in score is 4.83, with the average score of students taught with a flipped classroom being greater than those taught without a flipped classroom. It means that flipped classroom learning based on disaster map visualization has a better effect on students' critical thinking skills than self-efficacy. Students' skills to solve given problems (disaster mitigation efforts) is not only the skill to answer but to distinguish, diagnose, decide, and plan activities related to disaster mitigation efforts. It is necessary to perform a prerequisite analysis test before inferential statistical analysis. The first prerequisite test was the normality test with the Kolmogorov-Smirnov. The analysis results show that all data come from groups of data normally distributed as indicated by the value of sig. > 0.05. The result is presented in Table 3.

Table 3. Analysis Results of Data Normality

Skills	Approach_Learning	Kolmogorov-Smirnov[a]		
		Statistic	df	Sig.
(1)	(2)	(3)	(4)	(5)
Self-efficacy	Limited face-to-face with flipped classroom	0.13	30	0.20
	Limited face-to-face without flipped classroom	0.13	30	0.20
Critical thinking	Limited face-to-face with flipped classroom	0.10	30	0.20
	Limited face-to-face without flipped classroom	0.10	30	0.20

The results of the homogeneity analysis carried out show the same meaning where the research data comes from homogeneous data groups. These results can be proven from the value of sig. of each test is more than 0.05. The value of sig. in Levine's Test of Equality is 0.03 for self-efficacy and 0.45 for critical thinking skills. On the other hand, the homogeneity test with Box's Test of Equality of Covariance Matrices obtained a sig. value of 0.89 with an F value of 2.18. In the linearity test, the analysis results show the value of sig. on Deviation from Linearity of 0.71 (> 0.05). This value means a linear relationship between self-efficacy data and critical thinking skills. Thus, the prerequisite test for MANOVA analysis is fulfilled, with the data being normally distributed and homogeneous so that hypothesis testing can be carried out. The results of the complete analysis are described in Tables 4 and 5.

Three findings were obtained based on the analysis results in Tables 4 and 5. First, Pillai's Trace, Wilks' Lambda Hotelling's Trace, and Roy's Largest Root show that the F coefficient is 9721.78[b] with a Sig value. 0.00. It means a simultaneous difference in self-efficacy and critical thinking skills between students taught through flipped classroom learning based on disaster map visualization and those taught through limited face-to-face learning without the flipped classroom.

Table 4. Analysis Result of MANOVA Test

Effect		Value	F	Hypothesis df	Error df	Sig.
(1)		(2)	(3)	(4)	(5)	(6)
Intercept	Pillai's Trace	0.99	9721.78[b]	2.00	57.00	0.00
	Wilks' Lambda	0.00	9721.78[b]	2.00	57.00	0.00
	Hotelling's Trace	341.12	9721.78[b]	2.00	57.00	0.00
	Roy's Largest Root	341.12	9721.78[b]	2.00	57.00	0.00
Treatment	Pillai's Trace	0.19	6.67[b]	2.00	57.00	0.00
	Wilks' Lambda	0.81	6.67[b]	2.00	57.00	0.00
	Hotelling's Trace	0.23	6.67[b]	2.00	57.00	0.00
	Roy's Largest Root	0.23	6.67[b]	2.00	57.00	0.00

Second, the Tests of Between-Subjects Effects analysis results show an F value of 5.97 with Sig. 0.18, which is smaller than 0.05. It shows an effect of flipped classroom learning based on disaster map visualization on self-efficacy. Third, the Tests of Between-Subjects Effects analysis results show an F value of 7.13 with Sig. 0.01, which is smaller than 0.05. It shows an effect of flipped classroom learning based on disaster map visualization on critical thinking skills.

Table 5. Analysis Result of Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Corrected Model	Self-Efficacy	240.00[a]	1	240.00	5.97	0.02
	Critical Thinking	350.42[b]	1	350.42	7.13	0.01
Intercept	Self-efficacy	413008.07	1	413008.067	10281.18	0.00
	Critical thinking	432650.42	1	432650.42	8798.13	0.00
Treatment	Self-efficacy	240.00	1	240.00	5.97	0.02
	Critical thinking	350.42	1	350.42	7.13	0.01
Error	Self-efficacy	2329.93	58	40.17		
	Critical thinking	2852.17	58	49.18		
Total	Self-efficacy	415578.00	60			
	Critical thinking	435853.00	60			
Corrected Total	Self-efficacy	2569.93	59			
	Critical thinking	3202.58	59			

The results showed a significant effect of flipped classroom learning based on disaster map visualization on students' self-efficacy and critical thinking skills in disaster mitigation materials. Flipped classroom learning based on disaster map visualization provides opportunities for students to learn more independently and make the learning process less monotonous. This condition will make the learning atmosphere with disaster mitigation material more enjoyable and students more comfortable participating in learning. Comfortable learning will make students active in the learning process and motivated to participate in learning. Motivation is one of the crucial factors in the educational process (Schwinger & Otterpohl, 2017; Kryshko et al., 2021). The motivation in this learning can be seen from the activities of the students, such as the seriousness of work, the presentation of the best outcome, and curiosity, especially in completing assignments for disaster mitigation efforts and community participation in disaster mitigation, both for pre-disaster, during a disaster, and post-disaster to get optimal results.

The flipped classroom implemented in limited face-to-face learning makes students more interested in completing disaster mitigation tasks and more active during the learning process. The reason is that students are ready to take part in learning by studying at home through disaster assignments delivered. This readiness will eliminate anxiety in participating in learning, impacting the learning process and its results. In addition, this learning makes interactions between students and between teachers and students better. Students and teachers build effective interactions during limited face-to-face learning so that the communication process occurs from multiple directions. It indirectly helps the personality of students to communicate and collaborate. This phenomenon is seen when students use information sources that must be discussed to produce solutions as disaster mitigation efforts and involve the community in disaster mitigation.

Self-efficacy in their abilities in dealing with specific conditions related to disaster mitigation that must be done as homework makes students learn to be independent. Getting the opportunity to be independent makes students more confident in carrying out a responsibility, which will later form a better self-efficacy as one's optimism about one's abilities. The high self-efficacy that is built makes students able to do their assignments and exercises based on their knowledge and skills.

Based on this description, it can be said that high efficacy will impact students' strength (restraint, tenacity, willingness, and determination) in carrying out tasks so that it affects their performance in disaster mitigation learning. It is in line with what was stated by Huang and Mayer (2019), Huerta et al. (2015), and Qiu and Lee (2020). The formation of students' self-efficacy in participating in learning will increase students' motivation in the learning process and ultimately affect learning objectives. It is in line with what was stated by Evens et al. (2013), Huang et al. (2020), and Hyytinen et al. (2018). High learning motivation makes students take part in learning without coercion, and, of course, it impacts the desire of students to do better tasks by using various available sources. This activity certainly has an impact on students' learning outcomes.

One of the learning outcomes that has increased is critical thinking skills. As stated by Darby and Rashid (2017) and Firdaus et al. (2019), critical thinking is a skill that can shape children's various developments, both mental, moral, social, cognitive, and scientific. In disaster mitigation learning, this can be seen in students' activities to compare situations between regions by explaining problems and results and developing evaluation criteria using information sources to produce mitigation solutions. The skill is in line with what was stated by Ihsan et al. (2019), Pitt et al. (2015), Polat and Aydın (2020), and Sudarti and Putra (2015). Direct involvement of students in the learning process, as stated by Boso et al. (2021), Crismono (2017), and Ikhsan et al. (2017), also occurs in flipped classroom learning based on visualization of disaster maps. Through disaster mitigation materials, students can solve and control social problems that arise by conceptualizing, analyzing, and solving problems. It shows that optimal critical thinking skills have made students successful in the learning process, impacting learning outcomes. These descriptions illustrate that good self-efficacy positively impacts students' critical thinking skills.

There is an effect of flipped classroom learning based on disaster map visualization on self-efficacy. The flipped classroom that is applied in limited face-to-face learning requires students to learn independently because face-to-face meetings in class are limited in time, requiring students to learn what they are doing first. Learning activities carried out by students at home, in this case, are watching videos and reading disaster mitigation materials, followed by doing assignments. Suryawan et al. (2021) stated that activities at home cause students to form independent learning concepts with their own time. Through disaster mitigation videos, students analyze and examine disasters that occur so that students master the material better. In addition, by providing sufficient material from books related to disaster mitigation, students will be able to solve the assigned tasks, which has a positive impact on students' readiness. Having learned about disaster mitigation before makes students more prepared to carry out the learning process in the classroom. In addition, the existence of different methods in the learning process makes the learning atmosphere more interesting and the learning atmosphere more enjoyable. A pleasant learning atmosphere and students' readiness in the learning process produce good interactions so that a good relationship is established between students and learning resources. This condition certainly affects students' self-efficacy getting better because students are ready to carry out the learning process. High self-efficacy in one's ability to complete tasks, solve problems, deal with more difficult conditions, and have resilience in dealing with problems given. Students' self-efficacy is classified as good.

With the readiness of students in flipped classroom learning based on visualization of disaster maps, it is proven to develop students' self-efficacy. Students become more confident in conveying their analysis related to disaster mitigation and providing appropriate solutions to the disaster. With high confidence, of course, it will impact the students' disaster mitigation skills. It is in line with what was stated by Bressington et al. (2018), Shea & Bidjerano (2010); Simamora et al. (2019).

The effect of flipped classroom learning based on disaster map visualization on critical thinking skills shows that critical thinking skills are more influenced than self-efficacy. Flipped classroom learning based on disaster map visualization provides opportunities for students to develop thinking skills, in this case, the skill to distinguish natural disasters in Indonesia, diagnose the types of natural disasters, decide on appropriate countermeasures for natural disasters, and make strategies according to natural disasters. This skill develops well because students can learn actively independently and are given more flexible time in the learning process. The flipped classroom is learning that makes students learn independently. Students learn first about the topics before meeting with the teacher, and, for the problem-solving exercise process, it is used as homework (Dombrowski et al., 2018; Oktarina et al., 2021). Learning that familiarizes students to solve problems affects the development of critical thinking skills. In this case, students learn to analyze, decide, and make appropriate mitigation solutions for disasters. If they get used to it, their critical thinking skills will develop better.

Critical thinking is one of the important things that students have in the problem-solving process through analysis, interpretation, evaluation, and reasoning activities (López et al., 2020). Critical thinking involves mental operations, such as induction, deduction, classification, and reasoning (Alhamuddin & Bukhori, 2016; Polat & Aydın, 2020). Students with good critical thinking skills can achieve success in learning (Chen et al., 2018; Silberman et al., 2021). In this case, students' critical thinking skills impact students' skills to master disaster mitigation materials. Disaster mitigation material is one of the important materials that students must master.

Mastering disaster mitigation materials will provide students with knowledge and skills to deal with disasters that may occur in their area. With good critical thinking skills, students will be able to make or produce the most appropriate strategy to the disaster conditions in an area, given that each region has different conditions, so critical thinking skills are needed from students. In other words, good critical thinking skills will make students solve disaster mitigation problems well. Therefore, one of the lessons that can develop critical thinking skills amid learning limitations is flipped classroom learning based on a disaster map visualization. Even though the learning process is limited in place and time, careful preparation in the flipped classroom learning process based on the visualization of disaster maps will make this learning process more effective than the limited face-to-face learning process without the flipped classroom. Flipped classroom learning based on disaster map visualization provides opportunities for students to learn independently, is more flexible, and is student-centered learning.

CONCLUSION

Flipped classroom learning based on disaster map visualization affects self-efficacy and critical thinking skills in disaster mitigation materials. It is indicated by the increase of self-efficacy and critical thinking skills before and after learning. The results also show that critical thinking skills on disaster mitigation materials are the most influenced by flipped classroom learning based on a disaster map visualization. Students' critical thinking skills, which have increased, are the skills to distinguish, diagnose, decide, and plan related to disaster mitigation. Flipped classroom learning based on disaster map visualization makes learning student-centered, teaches students to learn independently, provides opportunities for students to seek the broadest possible information in the learning process, and prepares themselves first at home before participating in face-to-face learning through disaster mitigation videos prepared. It also develops higher-order thinking skills for students.

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