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## COLLABORATIVE LEARNING ONLINE LEARNING MODEL AS AN EFFORT TO IMPROVE LEARNING MOTIVATION AND CRITICAL THINKING SKILLS AT MUHAMMADIYAH ELEMENTARY SCHOOLS OF SURABAYA IN SOCIETY ERA 5.0

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### ABSTRACT

This article was written as a goal to find out the implementation of collaborative online learning as an effort to increase learning motivation and critical thinking skills at SD Muhammadiyah Surabaya in the era of the industrial revolution 4.0. Therefore, the development of science and technology in the 21st century, various positive and negative impacts are very complex. One of these impacts is felt in the world of education in Indonesia in the current era of conditions like today. The research method used an experiment with a quasi-experimental type. Then a quasi-experiment was carried out because not all influential variables could be tightly controlled. The research subjects were students of Muhammadiyah Elementary School in Surabaya by giving treatment in the form of Collaborative Learning Online learning model. The results showed that the level of high motivation was 35% and the level of very high motivation was 45%, so it can be stated that it was more optimal because high and very high motivation were more dominant than moderate and low. Meanwhile, critical skills were analyzed through pre-test and post-test with five indicators which totaled the pretest (60.2%) in the non-critical category and the total posttest was 87.2 in the very critical category. Based on the output of the Paired Samples Test, the value of sig (2-tailed) is 0.000. It showed that there is a significant difference in students' knowledge between before the Online Collaborative Learning model was carried out and after the Online Collaborative Learning treatment was carried out. This meant that the provision of learning treatment about the Online Collaborative Learning model can improve students' critical thinking.

**KEYWORDS:** learning model, collaborative learning online, learning motivation, critical thinking skills, elementary schools

## INTRODUCTION

Information and communication technology (ICT) is currently growing rapidly, requiring humans to participate in competition in a more advanced direction. Indonesia is a country that has human resources to participate and play a role in the advancement of ICT (Ahmad, 2012). The Central Statistics Agency (BPS) in collaboration with the Indonesian Internet Service Providers Association (APPJII) has conducted a survey on internet usage, especially in Indonesia. The survey results stated that the 2013 internet consumer data in 33 provinces spread over 78 districts or cities was 71.19 million people (Huda, 2020). Based on this, information and communication technology was developed to make it easier for humans to meet their needs in achieving goals. In the world of education in particular, it is necessary to continue to improve the quality and begin to apply information technology to facilitate learning activities (Wautier et al., 2005).

The development of science and technology in the 21st century has led to various positive and negative impacts that are very complex in a sustainable manner (Zou'bi, 2021). One of these impacts is felt in the world of education in Indonesia. Education in Indonesia is the main focus of society. Therefore, the educational process should always be dynamic following the times (Setiawan, 2018). According to (Vicente et al., 2021) that education must be able to instill the skills or future work skills needed in the Industrial Revolution 4.0 era, namely: 1) sense-making, 2) social intelligence, 3) novel & adaptive thinking, 4) cross-cultural competency, 5) computational thinking, 6) new-media literacy, 7) transdisciplinary, 8) design mindset, 9) cognitive load management, and 10) virtual collaboration.

Currently, Indonesia at the elementary school level has implemented learning using the 2013 curriculum in accordance with Presidential Regulation Number 87 of 2017 which has integrated KDP, literacy, 4C, and HOTS (Wahyudiyono, 2016). Strengthening Character Education (PPK) consists of religious, nationalist, independent, mutual cooperation, and integrity attitudes. Literacy can be translated into basic literacy, library literacy, media literacy, technological literacy, and visual literacy. 4C is a skill to communicate, collaborate, think critically, be creative, and innovate (Ahmad, 2012). According to HOTS (High Order Thinking Skill) are critical thinking skills and creativity, logic, reflective, and metacognitive (Bağ & Gürsoy, 2021; Y. Wang et al., 2021).

In facing the challenges of the 21st century, it is appropriate for the paradigm of education in Indonesia to be changed. Future education must be able to grow students' critical thinking skills, problem solving, creative thinking, and collaboration (Vicente et al., 2021; Vodovar et al., 2020). According to (Blakeslee, 2020) the three skills, namely critical thinking and problem solving, communication and collaboration, creativity and innovation, are indispensable in the world of education and the world of work. Critical thinking is a skill or skill that needs serious attention so that students' thinking patterns can grow well (Qi, 2021). In addition, critical thinking is also needed by students later to face all

changes in life. Critical thinking can be seen by identifying and analyzing information, demonstrating prior knowledge and making connections, and making conclusions (Kiili et al., 2020).

The implementation of the 2013 curriculum, which is the development of the KTSP curriculum, directs learning objectives into three dimensions, namely attitudes, knowledge, and skills. These three domains must be stated in the lesson plan when the teacher carries out learning activities (Huda, 2020). According to (Heinimäki et al., 2021) scientific learning organized by educational units must stimulate students to think actively and one of them is critical thinking skills. At the elementary school level, learning is carried out in an integrated manner which includes science subjects. Science is a subject that examines the world and the natural surroundings (Wahyudiyono, 2016). Science learning must be able to stimulate students to be able to think actively and be student centered (Näykki et al., 2021). The teacher's role is as a facilitator by providing and enriching the learning experience of students (Vodovar et al., 2020).

Learning experiences for students can be obtained through interactions with peers and the entire learning environment (Vicente et al., 2021). Teaching as a communication process has minimal sources (teachers), message recipients (students), and messages, namely subject matter. The success of students in learning is largely determined by the role of a teacher (De Backer et al., 2022). Teachers do not only think about the substance of the material and knowledge that will be given to students, but as professionals should also be able to manage the class by creating optimal learning conditions and how to teach fun material to students in order to achieve learning goals (Y. Wang et al., 2021). Then the teacher should be able to use innovative ways in every delivery of learning material and one of them is related to the selection of the learning model that is applied.

The selection of appropriate learning models can make students learn well; besides that, it will also make it easier for teachers to convey learning messages to students (Liang et al., 2021). The cognitive development period of children is divided into four stages, namely the sensorimotor stage, the pre-operational stage, the concrete operational stage, and the formal operational stage. Students in primary schools are divided into two parts, namely low grades and high grades (Muñoz-Carril et al., 2021). Elementary school students in high grade are included in the stage of concrete operational cognitive development, one of which is class V. The concrete operational stage is cognitive development that occurs at the age of 7 to 11 years. At this stage the child has started to perform operations and is starting to think rationally, but his intuitive thinking abilities as in the pre-operational period do not disappear until the child enters adolescence (Dong et al., 2021; Oga-Baldwin & Fryer, 2020).

### **Online Collaborative Learning**

Online Collaborative Learning is a teaching and learning activity that is carried out collaboratively and supported by specific tools. Online Collaborative Learning is seen as a promising innovation to enhance virtual learning activities. Modern information and communication technology assistance can be implemented in collaborative learning more efficiently (Han et al., 2021; Huang et al., 2017). Online

Collaborative Learning is the use of asynchronous computer communication networks in promoting social settings (Vidergor, 2021). Online Collaborative Learning settings come together in a virtual environment and promote collaborative work among students and enable more effective learning. Effective collaboration is achieved using technology in a network or in an internet setting. Online education systems and virtual learning environments enable students and teachers to learn collaboratively, access and use resources and offer individual and group learning settings (Wautier et al., 2005).

According to (Kiili et al., 2020) that Online Collaborative Learning in an effort to improve is 1) online, most students who are geographically isolated, allow learning from home, but can still have full access to all necessary resources via an Internet connection. them, 2) collaboratively, despite the different locations most of the students will do their learning in groups, and 3) by learning, in a group learning environment less emphasis is placed on memorizing and rote learning but more on real-world skills such as communication, problem solving, and the articulation of solutions. Therefore, online means learning materials and assignments are electronic. Interaction can be done synchronously via chat rooms or video conferencing facilities or asynchronously via email or discussion lists (Heinimäki et al., 2021). According to (Y. Wang et al., 2021) that in a collaborative group that is a completely virtual group, in the sense that group members may never meet in person.

However, in all cases the interaction between group members is very real and will depend heavily on others in the group to improve the quality of learning (Muñoz-Carril et al., 2021). The group is formal or informal, small or large, homogeneous or heterogeneous. In an environment where most learning takes place through group interaction, teachers tend to act more as facilitators than as active imparters of knowledge (Dong et al., 2021). Learning in this case is more emphasized on higher order thinking skills such as communication, problem solving, and articulation of solutions (Zou'bi, 2021). This high ability is something that must be possessed by graduates in order to compete in the world of work. Therefore, learning is no longer directed to memorizing the content of learning materials (Cai, 2021). Based on the description above, it can be concluded that online collaborative learning is a learning system that emphasizes group activities, where the learning materials and systems are carried out virtually with the support of information and communication technology (ICT) (Zou'bi, 2021). The use of computers and the internet in OCL is absolutely necessary, because if there are no such devices, it is certain that OCL cannot be implemented properly. The implementation of OCL can be carried out in synchronous and asynchronous modes (Muñoz-Carril et al., 2021). Synchronous mode, for example, uses chat room features (Zoom, Ms. Teams, Google Meet, and other video conferencing facilities) (Dong et al., 2021). While the asynchronous mode can use email. OCL also places more emphasis on higher order thinking skills such as critical thinking, creative thinking, and problem solving (Lin et al., 2019; Vidergor, 2021).

The implementation of online collaborative learning in the learning process has steps or stages that must be carried out by teachers and students. According to (Gauchotte et al., 2013) the stages of the online collaborative learning model are as follows.

1. The teacher conveys the goals and motivates students in learning.
2. The teacher presents information in the form of reading on social networking sites such as blogs, websites, mailing lists, and so on.
3. Students are required to read the teacher's writings in the form of science subject material for human and animal organs and then write down the results of their own thoughts by responding to the teacher's writing.
4. The teacher guides students to understand the readings so that there is no miss conception.
5. The teacher evaluates what has been learned with a short answer test or by making reflections that are uploaded by students on their respective social networks or blogs so that all groups can read.
6. Giving reward students' efforts in learning by giving values according to their abilities.

Learning phases so that online collaborative learning can be carried out properly. According to (Chikh & Berkani, 2010) that the phases are as follows:

1. Set the stage

In this phase the teacher prepares an online classroom environment including learning tools (Lesson Plan, teaching materials, worksheets, and others). In addition to this, in this phase it is also necessary to create a collaborative learning atmosphere.

2. Model the process

In the second phase, the teacher models, demonstrates. and equip students with the OCL framework. Collaborative activities online in discussion forums can be done using collaborative learning models jigsaw, PBL, role playing, send a problem, and think pair square.

3. Guide the process

In the third phase, the teacher monitors, directs the process, provides meaningful feedback, and encourages reflection on the learning that has been done.

4. Evaluate the process

In the last phase, the teacher evaluates the process and learning outcomes. In addition, after knowing the results, the teacher can use the results of the evaluation as material for improvement.

### **Learning Motivation and Critical Thinking Skills for Elementary School Students**

Motivation is a development of energy within a person which is marked by the emergence of feelings to achieve goals (Oga-Baldwin & Fryer, 2020). Therefore, someone has a goal, then someone has a

strong motivation to achieve it with all the efforts that can be done. Learning motivation is a psychological aspect that is experiencing development, meaning that it is affected by the physiological conditions and psychological maturity of students (Wen & Piao, 2020). According to (Rahmouni & Aleid, 2020) that motivation has a strategic role in one's learning activities. Some of the principles of learning motivation are:

- a. Motivation as a driver to carry out learning activities so that they are more enthusiastic in learning activities.
- b. Motivation in the form of praise is better than punishment, because by giving punishment students carry out learning activities because they avoid punishment.
- c. Motivation gives birth to achievement in learning because by being motivated to learn students will be active in doing lessons at home and at school so that expectations of satisfactory learning outcomes are achieved.

According to (Kulakow, 2020) the following indicators of motivation which are one of the measures in improving the student learning process can be explained as follows:

1. The existence of a desire and desire to learn
2. There is a drive and need in learning
3. There is hope and ideals in the future
4. There is hope in following lessons
5. Leads to interesting activities in learning
6. The existence of a conducive learning environment, so that it can allow a student to learn.

In addition to learning motivation that is able to make learning improve students' critical skills (Sanaie et al., 2019). Critical thinking is a process by way of thinking about ideas or ideas and having a relationship with concepts and problems that have been given or presented. Critical thinking can be understood by the process of analyzing ideas in a more specific direction, identifying, and reviewing (Boso et al., 2021). Critical thinking also includes the potential that individuals have that needs to be developed so that they become optimal abilities. Critical thinking is a process or activity that should exist in learning (Dykhne et al., 2021). Then critical thinking is reasonable and reflective thinking focusing on what to believe and do. critical thinking is one of the abilities in analyzing, interpreting, evaluating, summarizing, and synthesizing information (Bağ & Gürsoy, 2021).

Critical thinking is a very important ability possessed by individuals. critical thinking is a combination of abilities, knowledge, values, attitudes, skills, and processes (Huang et al., 2017; Lee et al., 2020). Therefore, this ability needs to be developed in the learning process so that students' thinking processes are growing. Critical thinking is a very important ability for individual life and has an affective function in all aspects of life. Critical thinking also includes the cognitive ability to identify, analyze, and evaluate opinions and truths in solving problems and making decisions about what to do (Lee et al., 2020). On the other hand, critical thinking is a detailed description of a number of characteristics

related to analysis, interpretation, inference, explanation, evaluation, and self-regulation (Qi, 2021; Zou'bi, 2021).

From some of the opinions above, critical thinking is a cognitive ability that involves skills related to reasoning in understanding, solving problems, analyzing, and evaluating the information that has been received after it is compared with the truth based on the knowledge and understanding possessed by individuals so that conclusions can be drawn on information that has been obtained correctly. People who are able to think critically are not easy to reject or accept something but they will analyze, examine, evaluate information before determining whether they accept or reject the information.

Critical thinking has indicators that can be applied in learning. According to (Ali-Abadi et al., 2020) critical thinking ability indicators are 1) basic clarification ability (elementary clarification), 2) basic decision-making ability (basic support), 3) ability to conclude (inference), 4) explanation, and 5) strategy and tactics. Then the critical thinking ability has indicators, namely: 1) interpretation, 2) analysis, 3) inference, 4) evaluation, 5) explanation, and 6) self-regulation. Therefore, it can be explained as follows:

1. Interpretation is understanding and expressing the meaning or meaning of various experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures, or criteria.
2. Analysis is to identify inferential relationships between statements, questions, concepts, descriptions, or other forms of representation that are intended to reveal beliefs, judgments, experiences, reasons, information, or opinions.
3. Inference is to identify and determine the elements needed to draw logical conclusions, form conjectures and hypotheses, consider relevant information and determine the consequences of data reports, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms. representation.
4. Evaluation is to assess the credibility of statements or other representations about the description of a person's perceptions, experiences, situations, judgments, beliefs, or opinions, and to assess the logicalness of inferential relationships between statements, descriptions, questions or other forms of representation.
5. Explanation is to explain the results of reasoning based on conceptual evidence, methodological considerations, criteria, and contextual, and to present reasoning in the form of convincing arguments.
6. Self-regulation is self-awareness to look at one's cognitive activities, especially by applying skills in analysis, and evaluation to assess conclusions with a view to questioning, confirming, validating, or correcting reasoning.

## RESEARCH METHOD

### Type and Research Design

This research was a quasi-experimental type of research. Quasi experiment was carried out because not all influential variables could be tightly controlled. The research subjects were students of Muhammadiyah Elementary Schools in Surabaya by giving treatment in the form of a learning model. Researchers in this case do not allow to form a new class. Then with a control group pre-test post-test approach with parallel used to compare between the treatment group (intervention) and the control group (without intervention).

### Research Targets

The population in this research were fifth grade students of Muhammadiyah Elementary School in Surabaya in the odd semester of the 2020/2021 school year. The population of this research were all students from SDM 4 Surabaya, SDM 8 Surabaya, and SDM 18 Surabaya. The subjects of the three elementary schools were taken on the grounds that all three of them had almost the same quality with almost the same culture.

This samples were taken from 6 classes, namely 3 classes of the experimental group and 3 classes of the control group based on three human resources in Surabaya. Determination of this sample using a cluster random sampling technique with the consideration that the number of SD and MI Muhammadiyah in Surabaya was large, namely 28 schools with various characteristics. Of the 28 SD/MI, there are three schools that have almost the same characteristics. Based on random results through lotteries that have homogeneity of nature, the selected classes were 2 class V from each of three schools, namely SDM 4 Surabaya, SDM 8 Surabaya, and SDM 18 Surabaya

### Data Collection Techniques

Data collection was a search activity that is used to answer problems that arise in research by recording all events, characteristics, information from various existing sources. In this research, the data collection techniques used include the following.

- a. The test technique in this research was conducted to measure students' creative thinking skills using essay questions. The test technique was carried out before the learning process (pre-test) and after the learning process (post-test).
- b. Observations were made by giving observation sheets in the form of a framework developed in the form of a value scale or in the form of notes from research findings related to the effectiveness of the application of the Online Collaborative Learning Model in the treatment class.
- c. Questionnaires or questionnaires collected through questionnaires were carried out through the provision of a list of questions that must be answered by respondents. This research aims to determine student learning motivation by giving a questionnaire or Likert scale.



### Data Analysis Techniques

Data description was carried out by univariant descriptive data analysis including standard deviation, variance, average, and graph. The description of the data for the dependent variable of critical thinking and social skills was carried out based on the data from the results of the pretest and posttest. For the independent variables using the Online Collaborative Learning Model. Then some data analyzes are described as follows:

#### 1. Analysis of the Implementation of the Online Collaborative Learning Model

The data obtained from the observation of the implementation of the collaborative learning online learning model can be analyzed by the following formula:

**Table 3.1 Criteria for the Implementation of the Online Collaborative Learning Model**

Interval Score PKP	Category
3,25 – 4,00	Very good
2,50 – 3,25	Good
1,75 – 2,50	Less
1,00 – 1,75	Good Enough

(Vodovar et al., 2020)

#### 2. Learning Motivation Analysis

Data obtained from observations about student learning motivation through a scale Likert during the learning process can be explained as follows:

**Table 3.2 Category of Learning Motivation Assessment**

Interval Score Rata-rata	Category
3,66 – 4,00	Very Good
2,66 – 3,65	Good
1,66 – 2,65	Enough
1,00 – 1,65	Less

(Tangkae et al., 2020)

#### 3. Analysis of Critical Thinking Skills

Data obtained from the results of students' creative thinking skills through pre-test and post-test as well as observation results during the learning process analyzed descriptively using the following formula.

$$\text{Acquisition score} = \frac{\text{Total score}}{\text{Maximum score}} \times 100\%$$

Criteria for students' critical thinking skills based on the percentage of scores obtained are categorized as follows.

**Table 3.3 Criteria for Critical Thinking Skills**

<b>Interval Score Average</b>	<b>Category</b>
81,6% - 100%	Very critical
61,2% - 81,5%	Moderate
40,8% - 61,1%	Not Critical

(Tapingkae et al., 2020)

Data on students' creative thinking skills were also analyzed statistically. Before being tested statistically, a normality test was carried out first. If the results of the normality test showed that the data is normally distributed, then the data can be analyzed using a paired T-test parametric test. Statistical data analysis of paired T test was performed using SPSS 21. Data were analyzed using a significant level ( $\alpha$ ) of 0.05. The criteria for the T test were if the significance value is  $< 0.05$  then  $H_a$  was accepted and if the significance value was  $> 0.05$  then  $H_a$  was rejected. If the results of the normality test showed that the data was not normally distributed, then the data can be analyzed using the Wilcoxon nonparametric test. Wilcoxon statistical data analysis was carried out using SPSS 21. Data were analyzed using a significance level ( $\alpha$ ) of 0.05. Wilcoxon test criteria are if the significance value  $< 0.05$  then  $H_a$  is accepted and if the significance value is  $> 0.05$  then  $H_a$  was rejected.

## RESULTS AND DISCUSSION

### Research Results

Based on the results of observations of the implementation of the Collaborative Learning Online Learning Model, the average score for each activity was 4 both at the 1st meeting, 2nd meeting, and 3rd meeting. The average score of 4 indicated that the activity was included in the very category. both with the percentage of implementation of learning of 100%. In the preliminary stage, the first step is motivation and problem orientation. The activities carried out are the teacher greeting students, making sure students are ready to take lessons, providing motivation to arouse students' interest in the material to be studied. This activity obtained an average score of 4 with a very good category at each meeting. The next stage is this activity which consists of a collaborative investigation of sharing tasks, presenting, and a collaborative investigation of jumping tasks.

In the investigative activity of sharing tasks, the teacher divided students into groups, then distributed worksheets and explained the instructions for doing it, and guided the discussion of each group. Furthermore, in the presenting activity, the teacher appoints one group to explain the results of the

group investigation, provided opportunities for other groups to ask questions or submit comments, and guided students in presenting the results of the investigation. The next activity was a jumping task collaborative investigation where the teacher distributes LKS (Student Work Institute), explained the instructions for doing it, and guided the discussion for each group. All stages of core activities at each meeting had an average of 4 and are included in the very good category. The last stage was closing with an evaluation step.

Activities in the evaluation step carried out are the teacher guiding students to review the material and reflect on learning, giving awards to students who ask or comment, and end the lesson. At each meeting, all activities in the evaluation step had an average score of 4 and were included in the very good category. Overall, the implementation of the Collaborative Online Learning Model to train critical thinking skills of SD Muhammadiyah Surabaya City students on the material presented was very well done. This implementation observed directly how a teacher taught by using the Collaborative Online learning model.

Based on the results of the research, data that included research data were obtained from 100 students of SD Muhammadiyah Surabaya City from three different schools consisting of SD Muhammadiyah 4 Surabaya, SD Muhammadiyah 8 Surabaya, and SD Muhammadiyah 18 Surabaya, which were selected through purposive sampling.

**Table 4.4. Characteristics of Respondents**

<b>Gender</b>	<b>Total</b>	<b>Percentage</b>
<b>Male</b>	65	0.65
<b>Female</b>	35	0.35
<b>Total</b>	100	100%

Table 4.4 shows that all male research respondents were 65 and female respondents were 35. Therefore, the total number of respondents was 100 people and more dominantly male – man. This meant that in this research more respondents were from men than women. Respondents were selected by purposive sampling conducted at Muhammadiyah Elementary Schools in Surabaya City, which consisted of 3 Muhammadiyah Elementary Schools in Surabaya.



Figure 1. Characteristics of Respondents

Table 4.5. Overview of Student Learning Motivation Levels

Category	Total	Percentage
Low	5	0,05
Enough	15	0,15
High	35	0,35
Very High	45	0,45
<b>Total</b>	<b>100</b>	<b>100%</b>

Table 4.5 showed the level of learning motivation of students at Muhammadiyah Elementary Schools in Surabaya, which consisted of SD Muhammadiyah 4 Surabaya, SD Muhammadiyah 8 Surabaya, and SD Muhammadiyah 18 Surabaya with a low level of motivation of 5%, a sufficient level of motivation of 25%, a high level of motivation. amounted to 35% and a very high level of motivation amounted to 45%. Thus, from the level of student learning motivation, it can be emphasized that it is more optimal because high and very high motivation are more dominant than moderate and low.



Figure 2. Student learning motivation level

Therefore, from the characteristics of the respondents and the description of the level of student learning motivation, it can be concluded that the respondents taken from three Muhammadiyah elementary schools in Surabaya were dominated by male students, while female students are fewer respondents. Then, on the level of student learning motivation with the Online Collaborative Learning model used has an impact on the level of learning motivation of students at Muhammadiyah Elementary School in Surabaya, which consists of Muhammadiyah 4 Elementary School Surabaya, Muhammadiyah 8 Elementary School Surabaya, and Muhammadiyah 18 Elementary School Surabaya. Because clearly it can be proven in a percentage that the very high level of motivation is 45%. Therefore, it can be concluded that teachers using the Online Collaborative Learning model can increase students' learning motivation, while the lowest level was 5%.

**Table 4.9 Pre-test and Post-test Analysis of Students' Creative Thinking Skills**

No	Indicator	Pre-test	Kategori	Posttest	Kategori
1	Giving a simple explanation	59.5	Not Critical	85.7	Very Critical
2	Building basic skills	60.4	Not Critical	87.1	Very Critical
3	Making Conclusion	60.2	Not Critical	88	Very Critical
4	Making further explanation	60	Not Critical	88.4	Very Critical
5	Setting strategy and tactics	61.3	Enough	87	Very Critical
Total		<b>301.4</b>		<b>436.2</b>	
Average		<b>60.2</b>	Not Critical	<b>87.2</b>	Very Critical

The results of the research on critical skills were analyzed through pre-test and post-test with five indicators which totaled the pretest (60.2%) in the non-critical category and the total posttest was 87.2 with the very critical category. From the indicators of giving simple explanations, building basic skills, concluding, making further explanations and setting strategies and tactics, it can be concluded that the average posttest was greater than the pretest.

**Table 4.6 Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	PRE-TEST	60.30	100	3.75379	.37538
	POST TEST	87.26	100	3.74872	.37487

From the output of paired samples Statistics, the results of the summary of descriptive statistics from both pretest and posttest data with the number of respondents were 100 students of SD Muhammadiyah Schools in Surabaya. Then the mean pretest was 60.30 and the mean posttest was 87.26. Then the

standard deviation of the pretest was 3.75379 and the standard deviation of the posttest was 3.74872. Meanwhile, the standard error of the mean on the pretest is 0.3753 and the standard error of the mean on the posttest is 0.37487. Since the average value of learning outcomes in the pretest was less than the posttest, which meant that  $60.30 < 87.26$ , it meant that descriptively there was a significant difference in average.

		N	Correlation	Sig.
Pair1	PRE-TEST & POST TEST	100	.002	.988

Output correlation or relationship between the two data or variables, namely pretest and posttest. Based on the output of the paired sample correlations, it was known that the correlation coefficient (Correlation) is 0.002 with a significant value (Sig) of 0.988 > probability 0.05. Therefore, it can be concluded that there is a relationship between the pretest and posttest variables.

		Paired Differences					t	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRE-TEST - POST TEST	-26.9600	5.30089	.53009	-28.01181	-25.90819	-50.859	99	.000

Based on the output of the Paired Samples Test, the value of sig (2-teiled) was 0.000. This showed that there was a significant difference in students' knowledge between before the Online Collaborative Learning model was carried out and after the Online Collaborative Learning treatment was carried out. This meant that the provision of learning treatment about the Online Collaborative Learning model can improve students' critical thinking. Strengthened by the Pair test Samples Test with a value "Mean Paired Differences" of -26.9600. This value indicated the difference between the average pretest learning outcomes and posttest learning outcomes or can be affirmed  $60.30 - 87.26 = -26.9600$  and the difference between the differences between -28.01181 to -25.90819 (95% Confidence Interval of the Difference).

**DISCUSSION**

The results showed that the Collaborative Learning Online Model had an impact on the level of learning motivation of SD Muhammadiyah Surabaya students which consisted of SD Muhammadiyah

4 Surabaya, SD Muhammadiyah 8 Surabaya, and SD Muhammadiyah 18 Surabaya can increase learning motivation and improve students' critical thinking skills. Thus, bringing online collaborative learning supported by technology also has an effect on increasing students' motivation and critical thinking skills (De Backer et al., 2022). Since actually collaborative learning is a combination that complements each other. With online-based collaborative learning, learning activities can not only be done in the classroom (Y. Wang et al., 2021). Through online media, students can always collaborate anywhere and anytime without having to be limited by space and time. Thus, the learning process can take place continuously and independently (Liang et al., 2021).

Online Collaborative Learning was a solution for students in learning difficult material by taking advantage of the diversity in the learning environment, namely by sharing ideas with peers who have different views (Muñoz-Carril et al., 2021). As defined by (Han et al., 2021) that collaborative learning was a product of shared ideas in which students propose to listen and respond to each other's ideas, then build a meaning or understanding through joint efforts in diversity or difference. Thus, collaborative learning required the students to actively participate in utilizing individual diversity. However, collaborative learning was different from cooperative learning (Dykhne et al., 2021). According to (Lin et al., 2019) explaining that collaborative learning prioritizes various activities rather than building ideas together. Therefore, collaborative learning places more emphasis on completeness and students' critical thinking.

This is confirmed by (Vidergor, 2021) that Online Collaborative Learning is a group learning model, where students in groups are motivated to interact and learn together to increase each other's understanding. In addition, collaborative learning is also a learning philosophy. As (Gauchotte et al., 2013) explained that "Collaborative learning is philosophy: working together, building together, learning together, changing together, improving together". From these definitions, it can be concluded that Online Collaborative Learning is a group learning model that emphasizes the process of sharing ideas through interactions between different students. views with the aim of increasing the understanding of each student. On the other hand, collaborative learning was considered productive when the teacher only takes a little intervention and allows students to practice their ability to solve the problems presented in the lesson.

Then collaborative work seriously empowers students and must dare to take all the risks that have been agreed upon (Chikh & Berkani, 2010). For example, the results of team or individual work are not approved, or in an unconvincing position, or too simple, or produce a solution that is not in accordance with the desired property (Andrianirina & Foucher, 2012). It is based on a view which states that each person has a hold, contribution to interpretative vocabulary, history, values, conventions and interests. Each student may "not have the same perception" as other students, so it cannot help students learn to negotiate the limits of knowledge that society already has, even though they may be academically mastered (Bellemare & Van Overbergh, 2013; Cai, 2021).

In Online Collaborative Learning, according to (Blakeslee, 2020) teachers must be able to stimulate students to interact. Because each of his knowledge has a core of knowledge that he is a member of a group that needs to get a role. Then collaborative learning allows a lot of added value, both for students and for teachers. According to (Vicente et al., 2021) states that the advantages of Online Collaborative

Learning includes;

- a. Students gain experience working together not only with their classmates, but with other students they have not previously known.
- b. In collaborative learning, the interaction between students they just met becomes focused because they follow a program that has been planned by the teacher,
- c. Collaborative activities will usually provide motivation and a competitive spirit in a positive sense for students.
- d. Students get a lot of learning resources from teachers other than their own school teachers who they have known so far.

In addition to these advantages, of course there were many other advantages, both direct and indirect. Internet-based collaborative learning initiatives had been piloted in 2005-2006 on the educational portal educational.net (now Rumah Belajar) (Setiawan, 2018). At that time the internet in schools was still very limited, so only a few teachers from five schools spread across several regions in Indonesia could participate in collaborative learning activities (Ahmad, 2012). One of the themes raised at that time was about forest fires (Qi, 2021). This theme was interesting because there were a lot of forest fires in Sumatra and Kalimantan at that time. With this collaboration, students in Jakarta (Java) become aware of forest fires, while students in Kalimantan and Sumatra can also exchange information on these events. It turns out that forest fires in each region have different characteristics (Kiili et al., 2020). To facilitate understanding, collaboration can be classified in at least three domains, namely; collaboration as competence, collaboration as action or implementation, and collaboration as a learning model (Näykki et al., 2021). As a competency, collaboration is one of the four 21st century skills suggested by UNESCO. This competency had been adopted in the 2013 Curriculum (Heinimäki et al., 2021). Not only for students, collaboration competence is also one of the ICT competencies for teachers, even at the ICT competency level, sharing and collaborating occupy the highest level. In the realm of action or implementation, collaboration is a form of cooperation to achieve common goals. Collaboration at this level can occur between teachers, between schools, or between institutions (López et al., 2020). While collaboration as a learning model is an effort from teachers or educators to increase the effectiveness and efficiency of learning, as a learning problem solving strategy and achieve learning objectives optimally (Andrianirina & Foucher, 2012).

In Online Collaborative Learning, teachers no longer give lectures in front of the class, but can act like facilitators by providing facilities that facilitate the learning process and regulate the physical environment, provide or show sources of information, create a conducive climate that can encourage students to have attitudes and behavior. certain behaviors, and designing tasks (Zou'bi, 2021).



Educators can also be models, actively trying to be examples in carrying out effective learning activities, such as exemplifying the use of learning strategies or how to express thoughts verbally that can help the knowledge construction process (Blakeslee, 2020). Teachers as facilitators can become trainers providing instructions, feedback, and direction to efforts in the learning process in increasing motivation and being more critical in dealing with various existing problems. Then the students keep trying to solve the problem before getting the actual solution from the teacher as a facilitator (H. Wang et al., 2021).

## CONCLUSION

From the results of the research, it can be concluded that Online Collaborative Learning that was very relevant to the situation in the current online classroom in the era of the industrial revolution 4.0 where with the learning process carried out together. The students can be involved in the learning process where holistic involvement can increase motivation and can improve critical thinking skills. In accordance with the results of research that had been analyzed descriptively that the high level of motivation is 35% and the level of very high motivation is 45%. Thus, from the level of student learning motivation, it can be emphasized that it is more optimal because high and very high motivation are more dominant than moderate and low. Then the results of the research on critical skills were analyzed through pre-test and post-test with five indicators which totaled the pretest (60.2%) in the non-critical category and the total posttest was 87.2 with the very critical category. From the indicators of giving simple explanations, building basic skills, concluding, making further explanations and setting strategies and tactics. It can be concluded that the average posttest is greater than the pretest. Based on the output of the Paired Samples Test, the value of sig (2-tailed) is 0.000. This showed that there was a significant difference in students' knowledge between before the Online Collaborative Learning model was carried out and after the Online Collaborative Learning treatment was carried out. This meant that the provision of learning treatment about the Online Collaborative Learning model can improve students' critical thinking. Strengthened by the Paired Samples Test with a value "Mean Paired Differences" of -26.9600. This value indicated the difference between the average pretest learning outcomes and posttest learning outcomes or can be affirmed  $60.30 - 87.26 = -26.9600$  and the difference between the differences between -28.01181 to -25.90819 (95% Confidence Interval of the Difference).

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