E-Learning Assisted by Finger Painting on Student Critical Thinking and Creativity

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A B S T R A K

Dampak covid-19 yang mengharuskan segala jenis kegiatan pembelajaran dilakukan secara daring. Proses pembelajaran daring yang cukup lama mengakibatkan rasa bosan kepada mahasiswa sehingga proses pembelajaran daring tidak optimal. Tujuan penelitian adalah menganalisis pengaruh *e-learning* berbantuan *finger painting* terhadap keterampilan berpikir kritis dan kreativitas *mahasiswa*. Jenis penelitian adalah penelitian ekperimen semu, rancangan penelitian ini menggunakan rancangan *posttest only control group design.* Populasi penelitian adalah mahasiswa semester III yang memperoleh mata kuliah konsep dasar IPA sebanyak 180 orang. Metode pengumpulan data yang digunkan adalah Tes dan Nontes. Penelitian ini menggunakan dua teknik analisis yaitu analisis deskriptif dan analisis infrensial. Analisis infrensial digunakan untuk menguji hipotesis penelitian. Sebelum melakukan analisis data infrensial, maka data yang diperoleh diuji terlebih dahulu normalitas dan homogenitasnya. Dalam penelitian ini analisis infrensial dibantu dengan menggunakan SPSS 17.00. Hasil penelitian dapat dikatakan bahwa dengan adanya pengaruh *e-learning* berbantuan *finger painting* terhadap kemampuan *critical thinking dan creativity mahasiswa* PGSD hal ini dapat dilihat dari hasil uji manova yang dilakukan bahwa nilai signifikan yang dihasilkan kurang dari 0,05 yaitu 0,00. Jadi dapat dikatakan bahwa dengan adanya pembelajaram *e-learning* berbantuan *finger painting* berdampak terhadap berpikir kritis dan kreati *critical thinking dan creativity mahasiswa* PGSD Undiksha. Hasil penelitian dapat dikatakan bahwa dengan adanya pengaruh *e-learning* berbantuan *finger painting* terhadap kemampuan *critical thinking dan creativity mahasiswa* PGSD hal ini dapat dilihat dari hasil uji manova yang dilakukan bahwa nilai signifikan yang dihasilkan kurang dari 0,05 yaitu 0,00. Jadi dapat dikatakan bahwa dengan adanya pembelajaram *e-learning* berbantuan *finger painting* berdampak terhadap berpikir kritis dan kreati *critical thinking dan creativity mahasiswa* PGSD.

A B S T R A C T

The impact of covid-19 requires all types of learning activities to be carried out online. The long online learning process results in boredom among students so that the online learning process is not optimal. The research objective was to analyze the effect of e-learning assisted by finger painting on critical thinking skills and student creativity. This type of research is quasi-experimental research, the design of this study used a posttest only control group design. The study population was 180 students in semester III who received basic science concepts courses. The data collection methods used were test and non-test. This study uses two analytical techniques, descriptive analysis, and inferential analysis. Inferential analysis is used to test the research hypothesis. Before analyzing inferential data, the data is tested for normality and homogeneity. In this study, the inferential analysis was assisted by using SPSS 17.00. The results of this research can be said that with the effect of e-learning assisted by finger painting on the critical thinking and creativity abilities of PGSD students, this can be seen from the Manova test results that the resulting significant score is less than 0.05, 0.00. So it can be said that e-learning assisted by finger painting impacts critical thinking and creativity, critical thinking, and PGSD students' creativity.

Introduction

The emergence of Covid-19 has an impact on changes in life in all areas of human life. It is not only in the field of Health which has changes, economies around the world are experiencing grievances in addition to these two fields, the field that has changed is the field of Education (Athena et al., 2020; Wong et al., 2020; Xiong et al., 2020). Education changes to the fully online learning process through many media such as social media, Google classroom, Meet, and zoom. In other words, learning that was initially face-to-face must be converted into online learning (Dong et al., 2020; Mishra et al., 2020). Online learning is one of the solutions offered in the current learning process. Online learning will help prevent the spread of Covid-19. Online learning

makes learning more flexible. The learning process is carried out according to the child's condition, is not regulated by time, and can be done anywhere (Anitha Kumari et al., 2020). One of the approaches applied is E-learning. E-learning can bring a new atmosphere in a variety of learning developments. E-learning uses various methods that effectively influence the learning process by presenting various learning content types to users. They are educated, among others, through collaboration software and the web (Anugrahana, 2020; Boussakssou et al., 2020; Kacetl & Semradova, 2020). E-learning learning has a positive impact on students' ability to increase knowledge and skills in the learning process (Mitra et al., 2020)

Online learning does not always have a positive effect. Online learning also has negative effects on children who are not sensitive to technology. The environment in which they live is not supported by the internet or signals (Hussein et al., 2020). Another impact is that online learning will make students bored because of the same methods or models. In other words, the learning model that is carried out is project-based and instead where students find and solve their problems. If the problem given is too heavy, it will cause frustration, and it will make students not doing and lazy to study (Duncan et al., 2013; Gunantara et al., 2019; Mahitsa & Mahardini, 2020; Nagge et al., 2018; Ratini et al., 2018; Şendağ & Ferhan Odabaşi, 2009). The existence of e-learning will also cause another problem, gadget addiction. This addiction is caused by students using cellphones or other communication tools continuously. This use is not looking for material but playing games or social media (Fajariyah et al., 2018; Rahmawati & Latifah, 2020; Samaha & Hawi, 2016). Based on this description, it can be said that e-learning will have a positive and negative impact. And the negative impact is the decreased enthusiasm of students in learning. Reduced student motivation will impact critical thinking skills and decreased student creativity; if this is allowed, it will impact the output. The output is students who can think critically and creatively to compete in the 4.0 era. The way that can be done is to make the learning process not require students to learn using communicative tools and provide opportunities for students to take advantage of the environment in which they live in collaboration with the organs they have. One technique that can be done is finger painting.

Finger painting can be interpreted as an activity to make an image done by scratching the color mixture directly with your fingers freely over the image area (Kurniawati et al., 2018; Martadini, 2016). *Finger painting allows students to draw according to what they think and their creativity without tools, and directly using the fingers to develop children's motoric skills* (Taiyeb, 2016). Finger painting is an interesting activity for children with more opportunities to build their knowledge and experience without coercion and doctrine from the teacher (Hasibuan & Ningrum, 2017). *Finger painting, the most prominent visual element is the quality of the strokes or line strokes and the play of colors, which provides an exciting experience* (Riftanto, 2019). The advantage is that it helps train children's fine motor skills because it involves finger activity that can be needed academically. Children can also develop their imagination to design objects where each child's imagination is unlimited. The results of previous studies support these advantages.

Research conducted by (2020) shows that children can be trained in developing fine motor skills, especially hands/fingers, using finger painting games in learning activities. Research conducted by Hasibuan & Ningrum, (2017) shows that finger painting activities affect the creativity of group B kindergarten children in Kabupaten Lamongan, as evidenced by the group that was taught using finger painting activities, their creativity was better than those who were not taught using finger painting activities. Research conducted by Taiyeb, (2016) shows that finger painting technique can improve the fine motor skills of children with Down syndrome from indicators, the estimation of the direction of each stage tends to improve, the mean level increases from baseline (A1) to baseline (A2), the percentage of data overlap from stage to stage tends to be small.

Based on the description of the advantages of e-learning and finger painting, the research objectives were formulated to examine the effect of finger painting-assisted e-learning on critical thinking skills and creativity. Collaboration between the E-learning model and finger painting can be expected to reduce students' boredom in the learning process so that students get excited again in learning online. Of course, this will impact students' critical and creative thinking skills.

Method

This study aims to determine the effect of finger painting-assisted e-learning on critical thinking skills and creativity. Therefore, this type of research is quasi-experimental research. Quasi-experimental is a type of comparison that compares the effect of giving a treatment on an object (experimental group) and sees the treatment's effect (Arikunto, 2015). This study's population was all PGSD students in the second semester in Singaraja, totaling 170 students who were evenly distributed in 6 classes, classes A-F. The sample of this research was the PGSD students in the second semester. Or in other words, sampling is done using group random sampling technique. Sampling was carried out in two stages. In the first stage, two PGSD Singaraja classes were drawn randomly, and the results were used as research samples. The two classes were randomly

selected into one experimental class and one control class. From these results, class E was an experimental group with 28 students, and class D was a control class with 32 students.

The data collected in this research is the score data of critical thinking and creativity skills of PGSD students in the second semester who take finger painting-assisted e-learning applied in the experimental class, and e-learning without finger painting in the control class. The data were from calculating the critical thinking and creativity test scores from the material being taught. The data collected is tabulated with mean and standard storage concerning critical thinking and creativity data. This study uses two analytical techniques, descriptive analysis, and inferential analysis. Descriptive statistical analysis techniques are used to describe the data. The research data are described according to the variables of critical thinking and creativity. Descriptive analysis displays the mean, standard deviation, mode, median, minimum score, maximum score, range, and data for each variable under study. A frequency distribution table and histogram for each research variable are also displayed and getting these prices. To see the tendency of critical thinking and creativity data. The average ideal score of all study subjects was compared with the average reality score. Meanwhile, for the inferential analysis, the manova analysis was used with SPSS 17.00.

Result and Discussion

This study examines finger painting-assisted e-learning on critical thinking and creativity of PGSD students in elementary science basic concepts courses. This research type is a quasi-experiment, sampling from the population held in random groups at the class level and not on individuals. This study's research design was a post-test only control group design. Analysis of the data in this study using Manova so that the data are 1) Data critical thinking students who take e-learning assisted by finger painting. 2) Data critical thinking of students who take e-learning without the aid of finger painting. 3) The data creativity of students who take e-learning assisted by finger painting. And 4) the data creativity of students who take e-learning without the aid of finger painting. Descriptive calculation results (mean, standard deviation, maximum score, and minimum score) can be seen in Table 01.

Tabel 1. Rekapitulasi Hasil Perhitungan Skor *Critical thinking* dan *Creativity* mahasiswa pada Konsep Dasar IPA

Variable	***Critical thinking***		***Creativity***	
Statistik	***experiment***	***Control***	***experiment***	***Control***
Mean	80,30	69,00	81,10	71,00
Median	80,00	68,00	81,00	70,00
Std. Deviasi	5,10	7,00	3,40	6,00
Skor Minimum	70,00	50,00	75,00	60,00
Skor Maksimum	89,00	79,00	88,00	80,00

Based on table 1, it can be seen that there are differences in students' critical thinking and creativity abilities between classes taught with finger painting-assisted e-learning and those taught with e-learning without finger painting assistance. This can be seen from the average score of students' critical thinking and creativity skills who are taught by e-learning assisted by finger painting that greater than 80.30 (critical thinking), 81.10 (creativity) while 69.0 (critical thinking) and 71 (creativity) in a class taught by e-learning without finger painting. The median score of students' critical thinking and creativity abilities between classes taught with finger painting-assisted e-learning and those taught with e-learning without finger painting assistance showed different scores. Each of them is shown 80.00 (critical thinking), 81 (creativity) classes taught with e-learning assisted by finger painting. In contrast, classes taught with e-learning without finger painting show the following scores 68.00 (critical thinking), 70 (creativity). The standard deviation score of students' critical thinking and creativity abilities between classes taught by finger painting-assisted e-learning and those taught with e-learning without finger painting assistance shows different scores. Each of them is shown 5.1 (critical thinking), 3.4 (creativity), classes that are taught with e-learning assisted by finger painting, while classes that are taught using e-learning without finger painting show the following scores 7.0 (critical thinking), 6,0 (creativity). The minimum score of students' critical thinking and creativity abilities between classes taught with e-learning assisted by finger painting and those taught by e-learning without finger painting assistance shows different scores. Each of them is shown 70 (critical thinking), 75 (creativity) classes that are taught with e-learning assisted by finger painting.

In contrast, classes taught with e-learning without finger painting show 50 (critical thinking), 60 (creativity). The minimum score of students' critical thinking and creativity abilities between classes taught with e-learning assisted by finger painting and those taught by e-learning without finger painting assistance shows

different scores. Each of them is shown 89 (critical thinking), 88 (creativity) classes taught with e-learning assisted by finger painting. In contrast, classes taught with e-learning without the aid of finger painting show the following scores 79 (critical thinking), 80 (creativity).

Assumption testing is performed to determine whether the available data can be analyzed by parametric or not. Regarding the statistics used for data analysis in this study, the assumption tests carried out include normality tests, homogeneity tests, and multicorrelation tests. Normality tests are carried out to ensure that the sample comes from a normally distributed population. Hypothesis testing can be carried out. This study's data normality test used the Kolmogorov-Swirnov test (Candiasa, 2007) with SPSS V.17 for Windows. The results of the analysis using the Kolmogorov-Swirnov test statistic showed that the Kolmogorov-Smirnnov statistical score for critical thinking and student creativity on basic science concepts in the experimental group and control group was greater than 0.05. So it can be concluded that the data group is the ability of critical thinking and creativity. Both the experimental and control groups are normally distributed so that further tests can be carried out.

The variance homogeneity test between groups was used to measure whether groups had the same variance between these groups. The variance homogeneity test between groups used Levene's test, carried out on two data groups. For the homogeneity analysis test through Levene's test, it appears that Levee's statistical score shows a significant score of more than 0.05 so that the next test can be carried out. To find out whether there is a high enough relationship between the variables critical thinking and creativity. If there is no high enough relationship, there are no similar aspects measured on these variables. Thus the analysis can be continued. The technique used to determine it can also use SPSS-17.00 for Windows using product moment correlation. It was found that the existing variables did not correlate, the tolerance score indicated this, and the VIF was close to 1. Based on these results, further tests could be carried out. Based on the prerequisite test results, both normality, homogeneity, and multicorrelation tests on critical thinking and creativity of PGSD students. It can be said that the data is normal, homogeneous. There is no multicorrelation relationship so that that hypothesis testing can be done.

The first hypothesis test results show that the relationship between the learning model (X) and critical thinking gives an F score of 8.584E3 with a significance of 0.000, which is smaller than the 0.05 significance level. This shows a significant difference in critical thinking ability between students who take learning with Finger Painting Assisted E-Learning and Finger Painting-Assisted E-Learning. Second, based on the multivariate analysis, which is listed in table 4.14, it shows that the relationship between the learning model (X) and creativity gives an F score of 1.394E4 with a significance (0.000) smaller than the significance level (0.05). It shows a significant difference in creativity between students who take learning with Finger Painting Assisted E-Learning and Finger Painting-Assisted E-Learning. So, there is a difference in the ability of critical thinking and creativity simultaneously between students who take part in learning with Finger Painting Assisted E-Learning and Finger Painting-Assisted E-Learning.

The first finding shows that the relationship between the learning model (X) and critical thinking gives an F score of 8.584E3 with a significance of 0.000, which is smaller than the 0.05 significance level. It shows a significant difference in critical thinking ability between students who take learning with Finger Painting Assisted E-Learning and Finger Painting-Assisted E-Learning. The difference in students' critical thinking ability who are taught by learning E-Learning assisted by Finger Painting and learning E-Learning without assisting Finger Painting cannot be separated from the treatment given. Even though the learning being taught is the same as the E-Learning system, the experimental class is given adding Finger Painting. E-learning can bring a new atmosphere in a variety of learning developments. E-learning is one of learning using various methods that effectively influence the learning process by presenting learning content of various types to users, those who are educated, among others, through collaboration software and the web. (Anugrahana, 2020; Boussakssou et al., 2020; Kacetl & Semradova, 2020). E-learning learning positively impacts students' ability to increase knowledge and skills in the learning process (Mitra et al., 2020). *E-learning facilitates interaction between students and material/subject matter. Students can share information or opinions on various matters relating to lessons or students' self-development* (Sari & Priatna, 2020).

Meanwhile, finger painting can be interpreted as an activity to make an image done by scratching the color mixture directly with your fingers freely over the image area. (Kurniawati et al., 2018; Martadini, 2016) . Finger painting allows students to draw according to what they think and their creativity without tools, and directly using the finger will allow the child to develop the child's fine motor skills (Taiyeb, 2016). Finger painting is an interesting activity for children with more opportunities to build their knowledge and experience without coercion and doctrine from the teacher (Hasibuan & Ningrum, 2017). With the combination of E-learning and finger painting learning, it will make the learning atmosphere not monotonous with e-learning alone. However, with the material's maturation by adding finger painting, students will not feel bored in the learning process. With a more enjoyable learning process, students can improve their critical thinking skills in solving the problems given. Critical thinking is an intellectual process in conceptualizing, applying, analyzing, synthesizing, and/or evaluating various information from observations, experiences, reflections, where the results

of this process are used as a basis for taking action (Crismono, 2017; Horohiung & Sarkadi, 2016; Maulana & Iswari, 2020; Setyaningsih et al., 2014). Critical thinking is divided into several indicators, being accurate and seeking accuracy; clear and seek clarity; open nature; refrain from impulsivity, placing oneself when there is a guarantee; and is sensitive and knows his friends' knowledgeability (Rahzianta & Hidayat, 2016). So it can be said that critical thinking is the ability to analyze facts, spark and organize ideas, defend opinions, make comparisons, draw conclusions, evaluate arguments and solve problems. Critical thinking is a way of thinking with logic and not receiving information raw. However, critical thinking here also demands how students must analyze problems and find solutions to these problems.

The results of existing research support this study's results. The research results from (Sudarti & Putra, 2015) states that developing real-life media video evaluation with system-learning improves physics students' critical thinking skills. Research result (Pradana et al., 2018) state that E-learning through Schoology media can improve critical thinking skills and learning outcomes in history learning. Research from Ihsan et al., (2019) states that the developed e-learning media has valid, practical, and effective criteria to improve students' critical thinking skills. Based on this description, it can be said that e-learning assisted by finger painting can make the learning atmosphere more enjoyable and make students more comfortable so that students focus on doing assignments or solving problems.

The second finding shows that the relationship between the learning model (X) and creativity gives an F score of 1.394E4 with a significance of 0.000, which is smaller than the significance level of 0.05. It shows a significant difference in students' creative ability to learn with finger painting-assisted E-Learning and E-Learning without Finger Painting Assistance. Finger Painting Assisted E-Learning learning can improve students' creative abilities because Finger Painting Assisted E-Learning learning will make students find new ideas in solving problems with this learning. The learning atmosphere is more enjoyable. Students more focused on learning. E-learning can bring a new atmosphere in a variety of learning developments. The good use of e-learning can improve learning outcomes maximally. The learning process is essentially a way of developing students' activities and creativity through various learning interactions (Sambada, 2012; Waty et al., 2018).

Creativity is a product of an idea. An idea is generated through a thought process that involves cognitive activity (Mayora et al., 2018; Murniati et al., 2019; Zulkarnaen, 2015). Creativity cannot replace a skill or expertise that has been nurtured for a long time with a strong professional discipline, but a touch of creativity is always able to enrich all areas of expertise (Faizah, 2017; Simanjuntak, 2017). The results of this study are supported by the results of research conducted by Abusiri, Ekawati, (2019) stated that the existence of learning with e-learning was able to increase the effectiveness of lecturers and students. (Waty et al., 2018) states that geography learning using a blended learning model can increase the learning creativity of students. And research results (Rohimah et al., 2020) state that the classification that e-learning media is very interesting to use to improve students' creative thinking in informatics courses in algorithm and programming material.

With the effect of finger painting-assisted e-learning on the critical thinking and creativity abilities of Undiksha PGSD students, this can be seen from the results of the Manova test conducted that the resulting significant score is less than 0.05, 0.00. So it can be said that e-learning assisted by finger painting has an impact on critical thinking and creativity, critical thinking and creativity of Undiksha PGSD students. With the combination of E-learning and finger painting learning, it will make the learning atmosphere not monotonous with e-learning alone. However, with the material's maturation by adding finger painting, students will not feel bored in the learning process. With a more enjoyable learning process, students can improve their critical thinking and creativity skills in solving given problems.

Conclusion

With the combination of E-learning and finger painting learning, it will make the learning atmosphere not monotonous with e-learning alone. However, with the material's maturation by adding finger painting, students will not feel bored in the learning process. With a more enjoyable learning process, students can improve their critical thinking skills in solving given problems and increase creativity. E-learning assisted by finger painting impacts the critical thinking and creativity of Undiksha PGSD students.

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