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Creative Thinking And Collaboration Skills: Improved Learning With The CORE Model Of Biology Subjects

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Abstract

This study aims to determine the increase in creative thinking skills and collaboration skills by using the Connecting, Organizing, Reflecting, and Extending learning models in class XI IPA students at SMAN 1 Sukoharjo. This research is included in the quasi-experimental research using a pretest-posttest control group design. Collecting data using tests of creative thinking skills and collaboration with students of class XI IPA SMAN 1 Sukoharjo. Samples were taken using the Cluster Random Sampling technique which consisted of class XI IPA 2 and XI IPA 3. This study was tested using the MANOVA test. Data analysis showed that results showed that there was a significant influence of the Connecting, Organizing, Reflecting Extending model on students' creative thinking skills and collaboration skills with a significant score of 0.000 <0.05. The conclusion is (1) there is an influence of the Connecting, Organizing, Reflecting Extending model on the creative thinking abilities of students at SMAN 1 Sukoharjo with a significant value obtained of 0.000. (2) There is an influence of the Connecting, Organizing, Reflecting Extending model on the collaboration skills of students at SMAN 1 Sukoharjo with a significant value of 0.002.

Kata kunci: Creative thinking, collaboration, *CORE* models

Peningkatan Keterampilan Berpikir Kreatif dan Kolaborasi : Pembelajaran dengan Model *CORE* Pada Mata Pelajaran Biologi

Abstrak

Penelitian ini bertujuan untuk mengetahui peningkatan keterampilan berpikir kreatif dan keterampilan kolaborasi dengan menggunakan model pembelajaran Connecting, Organizing, Reflecting, dan Extending pada peserta didik kelas XI IPA SMAN 1 Sukoharjo. Penelitian ini termasuk ke dalam penelitian quasi eksperimen dengan menggunakan pretest posttest control group design. Pengumpulan data menggunakan tes keterampilan berpikir kreatif dan kolaborasi kepada peserta didik kelas XI IPA SMAN 1 Sukoharjo. Sampel diambil dengan tekhnik Cluster Random Sampling yang terdiri dari kelas XI IPA 2 dan XI IPA 3. Penelitian ini diuji menggunakan Uji MANOVA. Analisis data menunjukan Hasil penelitian menunjukan bahwa

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terdapat pengaruh yang signifikan model Connecting, Organizing, Reflecting Extending terhadap kemampuan berpikir kreatif dan keterampilan kolaborasi peserta didik dengan perolehan nilai signifikan 0,000 < 0,05. Kesimpulannya yaitu (1) Terdapat pengaruh model Connecting, Organizing, Reflecting Extending terhadap kemampuan berpikir kreatif peserta didik di SMAN 1 Sukoharjo dengan nilai signifikan yang diperoleh 0,000. (2) Terdapat pengaruh model Connecting, Organizing, Reflecting Extending terhadap keterampilan kolaborasi peserta didik di SMAN 1 Sukoharjo dengan nilai signifikan yang diperoleh 0,002.

Kata kunci: Berpikir Kreatif, Kolaborasi, Model *CORE*

Biology learning is contextual learning that is centered on learners, this makes learners more active. (Noviati, 2020) In biology learning, creative thinking skills need to be developed to achieve goals in learning (Jayawardana & Gita, 2020). Learning objectives are results that must be obtained and mastered by students in the learning process.(Basar et al., 2021). One of the learning objectives is to be able to have creative thinking skills. Creative thinking is the ability to create ideas and ideas in creating a discovery. (Dilla, et al, 2019) Creative thinking has four indicators that can be observed including; fluent thinking skills *(Fluency),* flexible thinking skills *(Flexibility),* detailing skills *(Elaboration*), and Original thinking skills (*Originality*) (Layyina et al., 2021). Creative thinking can create a motivational boost in learning, being able to create and express ideas of ideas that are thought of. In addition to creative thinking, the collaboration skills of students also need to be improved (Dalilan & Sofyan, 2022). This is to the objectives of the 2013 Curriculum, namely so that students can have a person of faith, have creative, innovative, productive, and effective skills, and contribute to society (Triono, 2019). Someone who can create an idea and then develop the idea is someone who can think creatively. Some things affect a person's creative way of thinking including the insufficiency and openness that is presented in a situation, some things block the curiosity, responsibility in independence, and stressful situations that make an idea arise to always explore and develop things that want to achieve (Dilla, et al, 2019).

Skill is the ability to do it in a good, correct, and precise way (Indrawan et al., 2021). One of the skills that learners should have is collaboration skills.(Artawan et al., 2020) Collaboration skills are an ability to communicate in a group that is carried out by discussing to solve a problem (Maielfi & Wahyuni, 2020). With collaboration skills, students become more responsible and able to work together with group members to achieve common goals (Wela et al., 2019). The meaning of collaboration owned by

students is to train students in achieving the future, whereas in the realm of the world of work the attitude of cooperation, and responsibility is prioritized (Nuzalifa, 2021). The role of the teacher is very important in determining student collaboration skills. The use of the applied learning model must also be adjusted so that students' collaboration skills can increase. Collaborative skills are important to be trained from an early age to every child, this can train the ability to interact and express ideas or ideas to group members (Maielfi & Wahyuni, 2020).

The creative thinking skills and collaboration of learners are very important. But in reality, the creative thinking and collaboration skills possessed by students in schools are still relatively low (Maya, 2020). When the learning process is always teacher-centered, students become inactive (Talakua et al., 2020) so they are unable to develop the skills that must be possessed namely creative thinking. If this happens, the learner becomes dependent on the decision of the educator who makes the learner passive (Sunbanu et al., 2020). o in this case a learning model is needed. which is appropriate to achieve the objectives of the learning process (Kurniati et al., 2021). Saenab's research (2019) shows that the PBL (Program Based Learning) learning model which is a cooperative learning model to solve problems through discussion can improve student collaboration skills. In addition, Research by Pratiwi and Aslam (2021) shows that the Picture and Picture learning model can improve the creative thinking skills of students. This explanation proves that there is an increase in creative thinking skills and collaboration of students with the use of appropriate learning models. Maya (2020) in her research also showed that there is an influence of the CORE learning model on the creative thinking ability and collaboration skills of students in physics subjects.

One of the models. learning that can improve the creative thinking skills and collaboration of students above is the *Connecting, Organizing, Reflecting, and Extending* learning model (Indriani & Noordyana, 2021). The Connecting, Organizing, Reflecting, and Extending model is a learning model using its delivery through discussions starting in the process of connecting the knowledge that has been obtained with the knowledge that will be obtained (*Connecting*), organizing the knowledge that has been obtained (*Organizing*), recalling or reflecting and describing information (*Reflecting*), then expanding and developing the material knowledge obtained (*Extending*) (Susanto, 2022). earning through the discussion method can train students in the learning process, namely

being more creative, active, and able to collaborate (Luly, 2020). The Connecting, Organizing, Reflecting, Extending learning model has characteristics including; the Connecting, Organizing, Reflecting, Extending learning model prioritizes collaboration between students in solving a problem in groups, connecting new information with old information to form their knowledge through their experiences, increasing knowledge when solving problems given with various types, training students to think deeper and increase the creativity of students to manage all the information they get in the learning process, expressing ideas and ideas in learning is important in the activeness of students, educators act as facilitators and students as learning centers so that students are more active in the learning process (Susanto, 2022). Research that supports this learning model is research conducted by Indriani and Noordyana (2021) which states that the applied model, namely CORE (*Connecting Organizing Reflecting Extending*) learning, is better for improving the mathematical connection ability of students. In addition, this model, namely CORE (*Connecting Organizing Reflecting Extending Extending)* learning is also able to increase the power of critical thinking skills possessed by students (Hadiyati et al., 2019). This adds to evidence that the applied model, namely the CORE (*Connecting Organizing Reflecting Extending*) model, can improve various aspects of the learning process. Based on the explanation regarding the results of research conducted by other researchers, the title of this research is the update in the dependent variable. In the title of this study, the researcher chose the ability to think creatively and the collaboration skills of students in the Biology subject of the Respiratory System material. The choice of material for the respiratory system is due to novelty or being widely discussed in connection with the outbreak that has attacked the world, namely Covid-19. This material also has a lot to do with everyday life so that students do not feel foreign to the learning that will be given. This study aims to determine the effect of creative thinking and collaboration skills on students using the Connecting Organizing Reflecting Extending learning model.

RESEARCH METHODS

The research was conducted in April 2022 at one of the senior high schools, namely SMAN 1 Sukoharjo. This study is a *quasi-experimental* study with the *Pretest and Posttest Control Grub design.* This research takes a quantitative type of research. Quantifiable research has the aim of testing a hypothesis that has been established using

samples in a population, collecting data sharing with the help of research instruments, and being tested using statistics(Sugiyono, 2019). The sample stabilization technique was randomly selected using the *Cluster Random Sampling* technique. Measurements are carried out using creative thinking essay tests and observation sheets that are directly measured by researchers. The essay test consists of 10 questions which are then analyzed by students' answers using the rubric of creative thinking assessment (Selvia, 2018) with indicators that must be possessed by creative thinkers namely *Fluency, Flexibility, Originality, and Elaboration*.(Utami et al., 2020, Cahyono,). The following is a table of indicators of creative thinking skills.

Tabel 1. Indikator Berpikir Kreatif

Indikator	Kisi-Kisi
Fluency	Answering questions with more than one answer correctly
Flexibility	Answering questions appropriately based on facts and correct conclusions
Originality	Answering questions accompanied by reasons, easy to understand and precise Answering questions accompanied by reasons, easy to understand and precise
Elaboration	Answering questions by providing a clear, detailed, and detailed picture, and being able to explain them logically

Observation sheets of direct collaboration skills are assessed by researchers as learners have discussions. Analysis of observation sheets using collaborative skills assessment rubrics (Artawan et al., 2020) with indicators that must be possessed to work together productively, show mutual respect, agree with each other, share responsibilities and contribute. The assessment criteria for the essay test for creative thinking skills and collaboration skills possessed by students are as follows:

Table 2. Assessment Criteria

Interval	Criterion
(81-100)	Excellent
(61-80)	Good
(41-60)	Good Enough
(21-40)	Not Good Enough
(0-20)	Bad

Sumber : (Sugiyono, 2019)

The collaboration skills observation sheet is then analyzed using the formula:

Value = $\frac{student\ scores}{skor\ maximum\ ideal}\ x\ 100\%$

RESULTS AND DISCUSSION

The results of the research data that have been carried out include data on the results of the score between the pretest and the posttest score. The results of the data that have been obtained are then analyzed to determine their achievement and obtain the average value as follows:

Table 3. Average Value of Creative Thinking Skills of Experimental Class and Control Class

	Experimental Class			Control Class		
	Pretest	Posttest	N-Gain	Pretest	Posttest	N-Gain
Average Value	40,3	83,7	0,72	37,6	68,1	0,51
Criterion	Cukup	Baik	Tinggi	Kurang	Cukup	Sedang
Number of Students	30 Learners			30 Learners		

Based on table three, the average value of the pretest results in the experimental class was 40.3 and the control class was 37.6, which is not much different. After being treated, the posttest results in the experimental class were greater than the control class, namely 83.7 in the experimental class and 68.1 in the control class. Each indicator of creative thinking gets the value shown in the chart below.

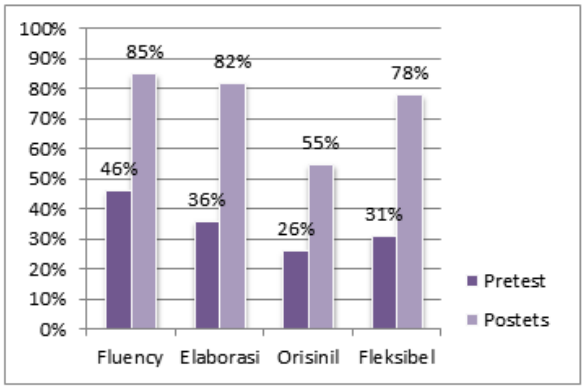
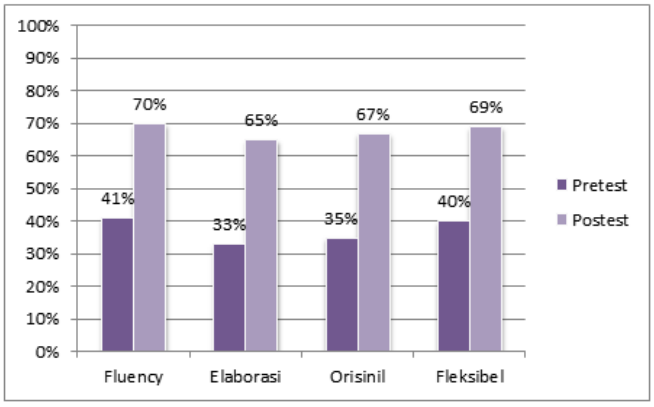


Figure 1. Grade Generation Chart Of Each Indicator Of Creative Thinking Experimental Class

Based Figure 1 shows the results of the values of each indicator in the experimental class. It can be known from the graph above that the value of the posttest result is higher than the value result during the pretest. Further obtained the results of the values of each indicator on the control class.



Picture 2. Value Acquisition Chart of Each Control Class Creative Thinking Indicator

Based on figure 1 and 2, in the control class and the experimental class the average results of each indicator in the posttest were greater than in the pretest. However, when compared between the graphics of the experimental class and the control class. Acquisition of value on each indicator, the experimental class is higher than the control class. The value of the fluency indicator is the highest compared to the values of other indicators. The application of the CORE learning model guides students to recall the material that has been studied, (Utami et al., 2020) and relates it to the material that will be obtained and organizes it which makes students more active and think more fluently in the material (Hadiyati et al., 2019). The fluency sub-indicator is guided to provide ideas, and to provide more than one answer. The role of educators in guiding and being a motivator in increasing student activity (Dalilan & Sofyan, 2022)

The results of the analysis of each indicator of creative thinking have different results. the first indicator is fluency thinking, obtaining the highest indicator results, namely 85% in the experimental class and the control class obtaining a percentage of 70%. On the fluency indicator (fluent thinking) students are guided to ask and answer questions posed by educators (Dalilan & Sofyan, 2022). In addition, students are also guided to spark many ideas in answering questions. Such as answering questions by expressing many ideas to maintain the human respiratory system. In this case, the educator helps students in expressing their ideas. Educators have an important role in

learning to make Susana's learning more enjoyable (Novita, 2021)

The second indicator is detailing skills with a value of 82% in the experimental class and 65% in the control class. It can be seen that the experimental class is higher than the control class. Sub-indicators in elaborative thinking is explaining and being able to detail a problem (Utami, 2020). Students are directed to find things to do when shortness of breath attacks humans. Students are also guided to detail each problem by adding different ways of delivering and solving problems. Students need to learn to solve problems. Expressing ideas in problem-solving is a way for students to use their knowledge abilities (Lestari, 2021).

Obtaining results The third indicator is flexible or flexible thinking with a value of 78% in the experimental class and 69% in the control class. Students are directed to solve a problem by thinking in a different direction (Layyina et al., 2021). The sub-indicator on flexible thinking has an interpretation of solving problems in the respiratory system. Here students are guided and directed to provide a solution towards different thoughts and can develop. In addition, students are also directed to produce various answers or questions in different ways and then have different ideas in groups as well as in solving problems that have different ways. Students who do learning in groups have high learning motivation the enthusiasm they have (Suprihatini., 2021).

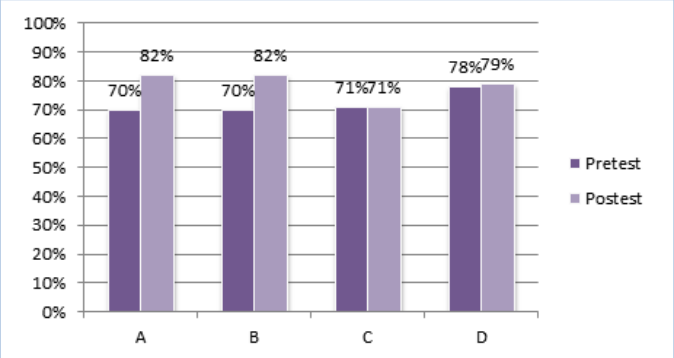
The acquisition of fourth indicator is originality or originality thinking skills (original thinking). Where in this generator the ability to generate new and unique ideas is very concerned about each student and can produce different and unpredictable thoughts. The sub-indicator of artwork given to students in solving problems in respiratory system disorders in smoking. The sub-indicators on these questions will be implemented when answering group discussion questions (Wahyudin., 2021).

The results of the data on the value of student collaboration skills are obtained when learning is carried out by random grouping, students will disqualify each group, then researchers assess the student collaboration skills using the available observation sheets. The results of obtaining the average score of student collaboration skills are as follows :

Table 4. Average Value of Collaboration Skills

Value	Experimental Class		Control Class Control Class	
	Meeting 1	Meeting 2	Meeting 1	Meeting 2
Highest	87,5	100	75,0	87,5
Lowest	62,5	56,3	50,0	62,5
Average	70,0	83,1	62,3	73,8

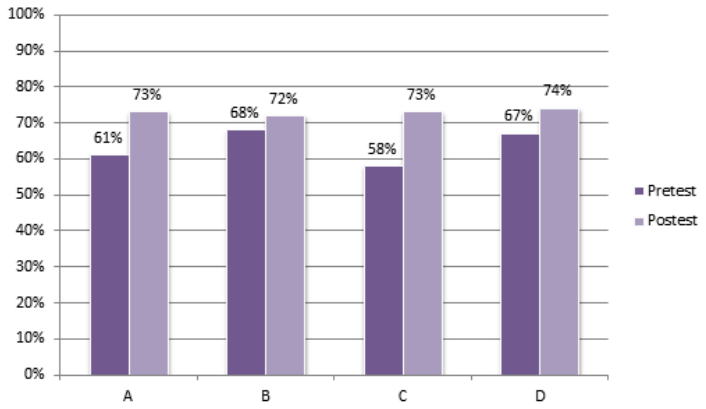
Table 4 shows of results of the average acquisition of the value of collaboration skills of students in the control class and the experimental class, it can be seen that the value of each meeting has results that are not much different from the control class. However, for the experimental class, the results obtained are higher when compared to the control class. At the first meeting, the experimental class obtained an average score of 70.0 and the control class obtained a score of 62.3. The second meeting obtained a higher average score for the experimental class of 83.1 and the control class of 73.8. Furthermore, the results of the values of each indicator are obtained as follows :



Picture 3. Graph of the Percentage of the Value of Each Indicator of Experimental Class Collaboration Skills

Based on picture 3 on the graph it can be seen that the acquisition value of each indicator has a percentage value that is not much different. Like research from Maya (2020) with the results that were not much different from the experimental class. Indicator A, namely working together productively, obtained a percentage of 82% during the posttest and 70% during the pretest. Indicator B, namely mutual respect, obtained a percentage of 70% in the pretest and 82% in the posttest. Indicator C is mutually agreed to obtain the same percentage of results between the pretest and posttest, namely 71%. Indicator D is being responsible and contributing to getting a percentage result of 78% at

the pretest and 79% at the posttest. The development of collaboration skills requires the right method so that students can improve their skills to the maximum. Learning that develops collaboration skills will run effectively influenced by the approach (Indrawan et al., 2021). The results of the acquisition of the value of each indicator in the control class are as follows



Picture 4. Graph of The Percentage of Value of Each Indicator of Control Class Collaboration Skills

In the graph above it can be seen that the acquisition value. on indicator A, namely working together productively, obtaining a percentage of 73% during the posttest and 61% during the pretest. Indicator B, namely mutual respect, obtained a percentage of 68% in the pretest and 72% in the posttest. Indicator C is mutually agreed to obtain a percentage of 58% pretest and 73% posttest results. Indicator D is responsible and contributes to getting a percentage result of 67% at the pretest and 74% at the posttest. If you look at it later and compared the graphics of the experimental class and the control class, the percentage of results obtained in the experimental class is higher than in the control class. Each student's collaboration skills have different results due to the driving factors that influence collaboration skills including thinking skills, personal motivation, and self-concept (Maya (2020)

Based on the results that have been obtained, the data in Figures 3 and 4 show that the initial data on the collaboration skills of students in the experimental class and the control class is not much different. It is stated that the experimental class or the control class has not mastered the material of the human respiratory system very well. After applying the model of connecting organizing reflecting and extending learning activities in the experimental class the results showed a fairly high difference from the

control class. The score in experimental class got an average post-test of 80.83 and the control class got an average post-test score of 72.71. From the acquisition of these data, it can be seen that the collaboration skills of the experimental class are higher than the collaboration skills of the control class. This happens because of the effect of applying the Connecting Organizing Reflecting Extending model to learning (Maya 2020)

The Connecting Organizing Reflecting Extending model is a learning model that emphasizes students' thinking skills in connecting, organizing, managing, and developing the knowledge gained. This learning model requires students to be active in the learning process to achieve learning goals (Susanto, 2022). There are advantages of the Connecting Organizing Reflecting Extending model which is used as a component that can support learning objectives that affect students' creative thinking abilities, namely that it can improve students' creative thinking abilities, by using a learning model according to the syntax which makes students more active in the learning process. learning (Luly, 2020), implementing discussions that make students interact with each other and express ideas, and exchange information, and can train students to remember a concept or information provided so that they can train students' collaboration skills (Layyina et al., 2021).

Many studies have tried to apply the connecting organizing reflecting and aesthetic model in improving students' mathematical abilities. As was done by Minankhus (2021) said in his research results that the CORE learning model can improve mathematical understanding. Mathematical understanding is important for students to have because it can develop metacognition abilities. Research conducted by Jahring (2020) states that the CORE learning model can improve mathematical connection skills (Indriani & Noordyana, 2021). The Connecting Organization Reflecting Extending learning model can develop and also train students' memory in a subject and lesson (Luly, 2020). The Connecting Organization Reflecting Extending learning model can also improve students' high-level thinking skills. Apart from that, the learning model can also affect student learning outcomes (Menik 2021).

The learning material used in this research is the human respiratory system which is one of the materials in class XI IPA. This material on the human respiratory system has detailed and in-depth material coverage. In this material, many tasks are carried out in groups and discussions, so the choice of the Connecting Organizing Reflecting

Extending learning model is quite good to use in this learning process. In the era of development, discussion, and group activities are very important for life in the future (Artawan et al., 2020). Because the discussion will be able to improve creative thinking by expressing many ideas, mutual respect, and being able to be responsible (Renny, 2020).

Accordance the hypothesis that has been prepared by researchers and based on previous research conducted (Maya, 2020) states that the application of the CORE (Connecting Organizing Reflecting Extending) learning model during the learning process in physics subjects affects the ability to think creatively and collaborate with students. The results of this study found that the application of the Connecting Organizing Reflecting Extending learning model affects students' creative thinking skills and collision skills.

CONCLUSION

Based on the results of the discussion and data analysis, regarding the improvement of creative thinking skills and collaboration by using. connecting learning model Organizing Reflecting Extending learners on subjects. biology can be concluded that: 1. Learners' creative thinking skills can be improved using connecting, organizing, reflecting, and extending learning models 2. Collaboration skills possessed by students can be improved using the Connecting, Organizing, Reflecting, and Extending learning models.

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