



## Improving Creative Thinking Ability of Prospective Elementary School Teachers through Read-Answer-Discuss-Explain-and Create (RADEC) Project-Oriented Learning Model

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**Abstract.** The objective of this research was to describe the improvement of the creative thinking ability of prospective elementary school teachers through project-oriented Read-Answer-Discuss-Explain-and Create (RADEC) project-oriented learning model. The researcher applied the mixing method consisting of descriptive qualitative research. The design of this research was pre-experiment one group pre-test post-test design subjects. The instrument of the research consisted of the test, observation sheet, interview, and field notes. The result of the research showed that the students' creative thinking ability increased significantly. The aspect of fluency increased by 40.1%, flexibility 43.81%, originality 37%, and elaboration increased by 45.04%. Therefore, it can be concluded that the RADEC project-oriented learning model can significantly improve the students' creative thinking ability.

**Keywords:** RADEC learning model, Project-oriented, Creative Thinking Skill

**INTRODUCTION** ~ The dynamical change of era has brought the world to evolution appearing in various issues coloring and changing people's lives in every aspect, including in the education aspect. The Industrial Revolution 4.0 is signified by the fast advance of industrial technologies in all sectors. There is a correlation between all sectors. The rapid advance of industrial technology demands the education sector to produce excellent human resources equipped with various skills to face the rapid development of technology.

Creative thinking skill is one of the skills must be developed to the students so that they are not only the connoisseurs. Students must be taught to be able to create something useful, meaningful, and usable for society. Therefore, they can play the role of developing the industry. They need intelligence, creativity, innovativeness, progressivity, being dynamic, and have good characters.

Creativity has been the trending topic in recent years. It is because creativity categorized as one of the 21st-century skills preparing students to face competition in



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the 4.0 Industrial Revolution and 21st-century challenge. Someone willing to face 21st century challenges must possess (1) critical thinking and problem solving, (2) communicating and collaboration, (3) creativity and innovation, (4) information literacy, (5) media literacy, (6) ICT literacy, (7) flexibility and adaptability, (8) initiative and accountability, (9) Leadership and responsibility (Kivunja, 2014)(Arafah, 2018);(Consalvo & David, 2016).

Based on the explanation above, education should emphasize learning activities based on 21st-century skills and the use of various literacies or multiliteracy. Partnership for the 21st century (Mendikbud, 2013) about the framework of 21st-century skills stated that a learning process is not enough if the students are only taught core subjects, they must also be taught how to think creatively. People possessing creative thinking skills can think futuristically and see opportunities carefully to get a solution based on problem-solving (Mahanal & Zubaidah, 2017)(Lee, Huh, & Reigeluth, 2015); (Tang, Cheng, & Wong, 2016).

Several types of research showed that creative thinking is an important thing mastered by students as a provision to face the future and to improve innovation (Seechaliao, 2017). Therefore, creative thinking skill is very important to be developed in the learning process in the classroom following future demands. Creative thinking skill is an important

component in the development of science and technology

Based on the test result held by TIMSS (Trends in International Mathematics and Science Study) and PISA (Programme for International Student Assessment), the students' thinking skill is categorized low, especially in science. Based on TIMSS result in 2015, Indonesia occupied the 45th from 48 participants with the mean score 397. The condition which is not much different can also be seen in the PISA result where Indonesia occupied the 62nd from 70 countries with 403 mean scores. Even though being ranked higher from the previous year, Indonesia is under the average score of OECD countries (Organization for Economic Corporate and Development) which is 493rd and place Indonesia in the 57th from 65 countries with the score of literacy 402, Mathematics 371, and Natural Science 383 (Arafah, 2018). The result from PISA and TIMSS showed that the students' creative thinking skill in Indonesia is still low and without problem-solving ability. The problem is 'has education in Indonesia prepared students fo creative thinking skill showed that the outcomes of middle school, diploma, and higher education are not competent in (1) oral and written communication, (2) critical and creative thinking as well as problem solving, (3) learning ethic and professionalism, (4) teamwork and collaboration, (5) work in pluralism, (6) utilizing technology, (7) leadership and management project. This



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condition is also experienced by students in the Islamic Institute (IAIN) Tulungagung.

The low creative thinking skill of the students is caused by ineffective learning culture implemented at school. The teachers do not habitual the students to think creatively. It was proven by the interview result from the students that lecturers are rare to allow the students to think creatively. The lecturer still applies conventional learning with the monologue learning method, although students are assigned to write a paper and present it by using a powerpoint slide show.

The solution for the learning problem above is to implement a learning model where the students are allowed to develop their creative thinking skills as stated in Indonesia 2013 Curriculum by using Project Based Learning (PjBL). Research done by Moylan (2008) showed that the implementation of PjBL can improve the students' 21st-century skills. The project model is a teaching-learning method providing the student's opportunity to develop their creativity in solving problems and to construct their learning so that they can create a product which is more values. The project-based learning model is a good option to avoid teaching from the conventional method (Sari, Hidayat, & Kusairi, 2018); (Liska Ariani\*, Sudarmin, 2019).

There are many difficulties faced when applying the PjBL learning method. It needs a longer time and a larger number

of budget to optimize every syntaxes phase so that the materials can be easily learned by the students. Moreover, students cannot understand the topics overall, the classroom tension is also difficult to control (Sartika Rati Asmara Nasution, 2018); (Isabekov & Sadyrova, 2018); (Ciftci, 2015). Explains that it needs various facilities and many works of literature when implementing PjBL. Therefore, multiliteracy learning is very important for today's students. Along with the fast development of technology, a variety of literacy emerged from various innovations, so that literacy is not just considered as a process of reading and writing (Yayli, 2009); (Untari, 2017); (Buckley-Walker, Tognolini, Lockyer, Brown, & Caputi, 2017). Multiliteracy Learning needs to be implemented to students so that they possess skills to be able to carry out learning in implementing Indonesia's 2013 curriculum well. It means that multiliteracy can improve various skills in the work field as one of them is creative thinking skills. That condition has inspired researchers to integrate PjBL with other learning models. PjBL with the Mind Mapping Satria Mihardi (2013) combined PjBL with KWL Worksheet. Those also encourage the researchers to collaborate on the PjBL learning model with Read-Answer-Discuss-Explain-and Create (RADEC) learning model to improve the students' creative thinking ability.

Based on the results of the researches above, it can be considered to implement



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RADEC project-oriented learning model. RADEC learning model is an effective learning model which is attractive and easily used because the syntax can be easily understood. This can be seen from them who consider (1) model syntax of RADEC learning model can be easily remembered and understood; (2) RADEC learning model can increase the students' 21st century skill; and (3) they are interested in doing research on the implementation of RADEC learning model (Sopandi & Handayani, 2019); (Rahmawati, Sopandi, & Darmawati, 2018). One thing that can prove RADEC can increase skills in 21st-century skills as one of them is creative thinking ability. RADEC model developed by Sopandi consists of four-phase, such as; Read-Answer-Discuss-Explain-and Create. Each phase has an activity. In the phase of reading is done before the class begins. It is intended to prepare the students to construct pre-learning activities. This condition is expected to stimulate and optimize the process of acquiring information from the materials studied. When obtaining a theory about the material students read a variety of literature through a variety of literacy, they do not only read the text. Students can study the literature from various sources in their environment and various media such as information from the internet, various learning media and so on.

The next phase is answering the question and confirming students' knowledge of the materials to be discussed and explained. In the phase of creating, to improve

creative thinking skills, students are recommended to complete a project. Following the Decree of Minister of Education number 22 in 2016, to encourage students creating contextual work, both individually and in the group, they are recommended to use the PjBL learning model (Sari et al., 2018); (Fajrina, Handayanto, & Hidayat, 2018)

From the discussion above, the researcher wanted to describe how to implement RADEC project-oriented learning model in the learning process. Moreover, the researcher would also like to prove whether RADEC project-oriented learning model has an impact on students' creative thinking ability.

## METHOD

This research was conducted applying the mixing method to answer two research problems. A qualitative descriptive method is used to answer the first research question namely 'how to implement the learning process by using a project-oriented RADEC model. Whereas the second research question was answered by a descriptive quantitative method with one group pre-test post-test design research design using 1 experimental class. The subjects of this study were 49 fourth semester students of class G of PGMI IAIN Tulungagung. The instruments used were free essays, student worksheets, interview guidelines, and project-oriented RADEC observation sheets.



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**RESULT**

Implementation Analysis of RADEC Project-Oriented Learning Process

Data gained from observation activity in the learning process by using RADEC project-oriented learning model is explained in the following paragraphs.

Read and Answer

Both of these stages are conducted before the learning process. Students are given pre-learning questions leading them to the project-based learning context. This pre-learning question is important and is very essential containing the assignment of students in carrying out an activity. It is clear that the target they have to do after the reading process. Questions and answers raised are essential aspects of cognition that students must master after they finish reading (Sopandi, 2017); (Sopandi & Handayani, 2019). In addition to learning sources from literature recommended by student lecturers, they are also given the freedom to dig up information from various other sources of information in their environment.

Based on the observation done during learning taking place for 45 out of 49 active students read and find out materials from textbooks, enjoying an opening laptop or cell phone to read an ebook or open an internet site. They also actively ask friends or other people who are more familiar with the material. From this process, it turns out that the project-oriented RADEC learning model also

develops various kinds of literacy (multiliterate) namely: reading literacy, technology literacy, and communication literacy (Buckley-Walker et al., 2017).

Discuss

At this stage, learning in class, a group of students answer LKM and arrange projects to be done. They also discuss answers to the questions they have done. At this stage, interactions between students and their ability to think creatively begin to emerge through the process of expressing ideas in their group project planning.

Completion of assignments in groups and work together in completing projects can train students' creative thinking abilities flexible in thinking, and able to view problems from various points of view and be able to bear many ideas (Ayu & Tri, 2019)

Explain

At this stage the process of motivating and exemplifying project work schedules that have been carried out previously. The students make a schedule of implementation of project activities, present and communicate the project designs that will be commented on, rectified and corrected by the lecturer or facilitator. The facilitator also provides procedural understanding in understanding concepts, theories, and principles in science. Students use those understanding to design a project allowing the creation of new technology products



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that are valuable and realistic as well as beneficial to everyday life in society (Seechaliao, 2017). The condition where students can communicate freely, support each other, trust each other and discuss new ideas is an ideal environment that strongly supports creativity (Seechaliao, 2017). The impact of the process is to prepare students for the Create stage or create something from a design that has been created.

### Create

The phase of creating phase is the realization of ideas from the students' creative thinking that has been thought before both individually and collectively. After they make a product and its report, then the product is presented and will be assessed by the group, other groups, and lecturers. After that, students and lecturers provide feedback and reflect on all project activities and activities

The result of observation indicated that the students had been able to express their creative ideas in creating s useful product. For example, is making a learning video, a three-dimensional chart of the plant process of propagation from cardboard, flannel boards, making native plant specimens from plasticine and etc. However, there are still several groups that only make two-dimensional chart products from Manila paper. After doing analysis, I found that the group that could make products that were different from usual before was actively seeking information from various sources and media, such as

opening the internet. While the mediocrity, they only gain information from reading textbooks. This proves that cognitive ability is important in supporting one's creativity.

Creative products produced by students are products that can be used for daily needs. The products can also be used as sources and learning media for vegetative propagation of plants. The creative product assessment table can be seen in the following table 1.

Based on the table above, the project-oriented RADEC model, there is a significant increase in each indicator of the ability to think creatively. This happened because it was carried out following the existing stages and collaborated with the project. Phase read with students digging information from various sources both books, other printed sources of information and other sources of information such as the internet. The developed is fluency and flexibility. The Answer phase or answer (before learning) students collect information and can answer questions given by lecturers/researchers obtained from various sources such as reading books, discussions with friends/family, searching through the internet, etc. The developed BKK is fluency, elaboration, and flexibility. The Discussion stage or discussing students is divided into several groups, discussing answers to questions of LKM, LKK and working on project plans under material that has been shared and agreed upon. KBK developed fluency, elaboration, and



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flexibility. The next stage Explains or explains the project plan that will be stated honestly and responsibly which is responded by other groups. KBK developed fluency and originality. The final stage is Create by discussing, collaborating, pouring various kinds of thoughts, creative ideas and making projects independently with their groups. Next, present the work. KBK developed fluency and originality. Each stage of RADEC project-oriented develops creative thinking skills as well as multiliteracy at the stage of reading.

The gain of Creative thinking skills

The gain of all aspects of creative thinking skills Students 'creative thinking skills increased. The significant increase of students' creative thinking including aspects of fluency increased by 40.1%,

flexibility 43.81%, originality 37%, and elaboration 45.04%. This improvement was because the project-oriented RADEC model is designed to provide opportunities for students to obtain as much information as possible from various kinds of literature. Besides, it also helps students to express various creative ideas and provide space to express their creativity in working on projects.

Table 2 also shows that from the four aspects, the aspect of creative thinking indicators, the lowest scores were in the originality aspect increased by 37%. This was because of all creative products where there is no student able to design innovative products differently from others. The results of the product project are almost the same, namely learning media.

**Table 1.** Mean Score of Creative Product Assessment

| Aspect of Product Assessment | Mean of Each aspect | Predicate |
|------------------------------|---------------------|-----------|
| Novelty                      | 80,92               | Good      |
| Originality                  | 81,54               | Good      |
| Resolution                   | 81,84               | Good      |
| Elaboration                  | 80,15               | Good      |
| Mean Score                   | 81,11               |           |

**Table 2.** Mean Score of Creative Thinking Skill

| Indicator of Creatif Thinking Skill | Pretest Score |          | Posttest Score |           | Improvement |
|-------------------------------------|---------------|----------|----------------|-----------|-------------|
|                                     | Percentage    | Creteria | Percentage     | Criteria  |             |
|                                     | %             |          | %              |           |             |
| Thinking Fluency                    | 55,3          | Low      | 95,4           | Very High | 40,1        |



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|                                      |       |          |      |           |       |
|--------------------------------------|-------|----------|------|-----------|-------|
| Thinking Flexibility                 | 50,79 | Low      | 94,6 | Very High | 43,81 |
| Thinking Originality                 | 38    | Very low | 75   | Medium    | 37    |
| Thinking Elaboration                 | 39,96 | Very Low | 85   | High      | 45,04 |
| Average Ability of Creative Thinking | 46,01 | Low      | 87,5 | High      |       |

**DISCUSSION**

Creative Thinking Skill in Each Indicator

The Fluency of Creative Thinking

Students with fluent thinking skills will provide a complete response. The more answers and ideas appear the more fluent they think. The achievement of fluency indicators on the results of working on LKM is 95.4%, meaning that almost all students master creative thinking skills on fluency indicators. The data prove that students have produced thoughts with many ideas called divergent thinking.

This happens when the project-oriented RADEC learning process takes place at the read stage. Students are very enthusiastic about reading looking for sources of information from various literature both books, the internet, and other sources. The results of interviews with lecturers who said that class G students are students of choice with abilities above the other classes.

Flexibility

Flexible thinking skill was in the high category with an achievement of 94.6% meaning that almost all students understand the picture of plants and can identify the breeding tools in each of these plants. This proves the effectiveness of the

RADEC learning model. With the diversity of information extracted in the phase of reading, students can think flexibly to interpret and identify the figure in the LKM.

Elaboration

The percentage of thinking skills on elaboration increased by 85% meaning that almost all students can solve problems in LKM. This is indicated by students' ability to design schedules and procedures to make projects that will be implemented. This was supported by the results of interviews with students that they are very happy and enthusiastic about the learning by using the project-oriented RADEC learning model. They could easily understand the stages that accommodate aspects of elaboration namely the Answer, Discuss and Explain stages.

In the stage of Answer, students can elaborate on the answers in detail. This was because in the previous stage they have been provided with various information that they have extracted from various sources and references.

In the phase of Discuss, students can collaborate in a group and discuss to solve problems on LKM questions and make detailed and structured project designs.





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The phase of Explain is signified by the students' ability to communicate their ideas in groups to design projects. Besides, students must present in detail the project design they have in front of the classroom and will be commented on by other groups. The observations showed that the ability to communicate project designs and to respond to criticisms, input, and opinions of other groups is included in the high category. In conclusion, the three stages of RADEC supported the improvement of creative thinking skills in the elaboration indicator.

### Originality

Achievement of the indicator of originality in LKM was 75% which means that there were only three-quarters of the students who master originality thinking skill. This happened because they are accustomed to doing something based on books. They feel difficult to develop ideas.

This is proven by the results of the projects made that some projects are not very different from books or the internet. They have a lack of confidence in the results of their thinking because some projects are the same as other groups even though the material is different. Therefore, the achievement of the originality indicator is at the lowest position compared to other indicators. The data was supported by interviews and questionnaires showing 85% or almost all students have never applied the learning model and designed their projects.

## Conclusion

Based on the result of research and data analysis, it can be concluded that there is a significant improvement of the students' creative thinking skills through the project-oriented RADEC learning model. This model can be implemented in the learning process in Group 4G PGMI at IAIN Tulungagung.

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The results of the study and analysis in this research can be used to develop a project-oriented RADEC learning model in delivering different materials and levels of education, for example in Elementary School / Madrasah Ibtidaiyah (SD / MI).

This research applied a quantitative approach with a pre-experimental one group pre-test design post-test design. It is hoped that the next researchers will apply other approaches such as qualitative and R & D Research, and other designs such as experiments and so on.

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