An Implementation Of *Icare* Approach (Introduction, Connection, Application, Reflection, Extension) to Improve The Creative Thinking Skills

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Abstract. This study is aimed to get an overview about the increase of creative thinking skills in ten grades high school students as the impact of the implementation of the ICARE approach to the dynamic electrical material. This study is using pre-experimental method. And, the research design is one-group-pretest-posttest. In this case, the participants of this study are students in ten grades in one senior high school in West Java which is randomly selected. The data is collected from the students by doing pretest and posttest in order to measure the increase of students' creative thinking skills. In the final analysis, the results of this study presents that the implementation of the ICARE approach generally increase the students' creative thinking skills. The result of the N-Gain showed that the students' creative thinking skills increased by the average score of 0.52, categorized as medium. This is caused by the implementation of ICARE approach to the application stage.

1. Introduction

The era of globalization and technology not only facilitate people in the matter of using but also confronts human with a challenge and some complex problems. The development of technology was increasing the changes of human life rapidly. Consequently, every individual should be able to solving all the problems in daily life. Creative thinking skills are necessary in order to solve the complex problems in the future [1], especially in the 21st century.

Assuming that students have a potential to be creative, then there are many ways to awaken, stimulate, develop, and access the students to the creative potential. In fact, an educator suggested to prioritizing the suitable establishment and implementation approach in order to enhance the students' creativity. Supposedly, creative thinking skills should be practiced at all levels of education from primary schools to universities to achieve the goals in accordance with the demands of the educational curriculum [2]. Hopefully, with good thinking skills students can stimulate their creative thinking skills to solve problems in daily life by using their knowledge.

In contrast, according to a preliminary study conducted in one Senior High School in Bandung shows the result of the creative thinking test s that are given is in the amount of 32,5, is still very low. The result is triggered by five main factors: (1) learning process is still informative; (2) learning is still dependent on the teacher; (3) learning is a memorizing activity; (4) teachers rarely practicing the

comprehension ability; (5) teachers rarely practicing some experiment activities, and learning of physics is still the focus on the count. For this reason, many students assume that physics is a difficult and complex subject.

Therefore, as the solution to the problem, we recommend for the use of ICARE approach to enhance the students' creative thinking skills. When the students have been interested in some subjects that taught in the school, especially Physics, the students are expected to be more comprehensive on the subject. Moreover, when the students have been able to find the relation between the concepts they learned in class and its application in everyday life.

2. Theory

2.1. Creative thinking

Creative thinking skills is the skills to think of many possibilities; to use various methods; to use different point of view; to think of something new and innovative in order to guide the teachers in generating and selecting alternatives, Isaksen [2], According to Jawar [3] creative thinking known as mental activity that aimed to build a strong desire in order to find a solution or solutions previously unknown.

The source of the creativity is in someone who realizes that there is something wrong, less, and mysterious. One of the prominent features of the creative person is that he or she is be able to discover a problem while the others do not. On the contrary, the person that is unable to discover the problem behind the issues can be categorized as not creative person. Thus, think creatively is one element in the problem solving process.

One of the necessary capabilities of the 21st century is the problem solving abilities. Generally, problem solving is usually perceived as an activity of making a solution based on the knowledge of the person has been learned. Problem solving is an effort to find answers based on knowledge, understanding, and ability that the person has in order to provide demands from the uncommon situation [4]. Guilord [1] states the close relationship between creative thinking and problem solving. He said that creative thinking is a part of the solution. Furthermore, think creatively produce new products, and problem solving involves producing a new response to the new situation of the new result, Guilord [1]. It can be concluded that any solution has creative aspects.

Equally important, Torrance [5] suggested that there are four main indicators of creative thinking skills, those are fluency, flexibility, originality, and elaboration. Firstly, fluency is used to create ideas, answers, problem solving and questions, provide some suggestions to do various things also always prepare for more than one answer. Secondly, flexibility is the ability to understand the questions or topics from different perspectives, and be able to change the approach or the way of thinking, the ability to express some solutions or approaches into the problems. Examples to this indicator such as, generating ideas and alternative solutions to problems. After that, originality is the ability to create new and unique expression, thinking the unusual way to express yourself and be able to make combinations that unusual from the elements. Lastly, elaboration is the ability to add a situation or problem that it becomes complete and detail, in which there are tables, charts, models, or ideas, including the ability to develop new product ideas in order to add details to an object. This study focuses on creative thinking skills in problem solving.

3. ICARE Learning Approach

ICARE (Introduction, Connection, Application, Reflection, and Extension) is a model of learning that is focus on understanding the concepts and applying learners' knowledge [6]. Historically, the model was introduced in 1997 at San Diego State University by Bob Hoffman. This model is a framework pedagogic with online learning system at San Diego State University. But it is possible to be used at United Stated Agency International Development (USAID) of Indonesia through the Decentralized Basic Education (DBE) which is in 2006 was introduced and using ICARE learning model as a framework for the research about teachers and learning process in schools [7].

The most interesting thing from the ICARE learning model is its flexibility. ICARE learning model can provide an opportunity for teachers to change students' learning experience through an emphasis on every stage. For example, teachers put more emphasis on the Connection stage, and then the teacher should use the methods or approaches that could improve the ability to understand concepts to the students. Meanwhile, on the Application and Reflection stage, teachers are required to use an approach that reflects the constructivism learning and teachers play role as the learning facilitators for students. ICARE models also provide an opportunity for the teachers to create a special module depends on the consideration of the students' ability (Ress; 2011). Refer to the standard of educational process; there must be an increase and balance between hard skills and soft skills in a learning process. Fortunately, at the Connection and Application stage, the students can get the increase and balance their hard skill and soft skill.

3.1. Definition of ICARE model
Model ICARE is a learning model that was developed in 1997 initiated by Bob Hoffman. Initially, ICARE Learning model is designed for learning online system. As time goes by, in 2006 ICARE models began to be used as a model of learning in the classroom. The stages of ICARE models are:

a. Introduction : at this stage, the teacher establishes the content of the lesson to the students. This must include an explanation of the objectives and goals that are expected to be achieved during the lesson. At this stage the teacher introduce the students about the phenomenon that have been designed for contextual learning. Then, the students observe the phenomenon, and they have the opportunity to asking question(s) about phenomenon that is being displayed. Other than that, motivation should also be given at this stage in order to make the students interested in learning material that will be given in the classroom.

b. Connection :at this stage, the teacher tried to relate the new knowledge with something already known by the students from learning or experience in daily life. In the classroom, teacher demonstrates the materials, and there is a question and answer session that makes students tell what they remember from previous learning experience. The most important thing at this stage is an investment of the concept in a way to invite the students to plan and conduct some activities independently or group that performs the example in the context of real-world based on the inquiry.

c. Application :the application stage is the most important stage of learning. After the students acquire new knowledge or skills from the connection stage, they should be given the opportunities to implement these knowledge and skills in their daily activities at school. The application stage of learning takes the longest period in the learning process because students are required to conduct experiments or to implement their knowledge in a real world context. And this is different than a sample application that has been done at the previous stage, Connection stage.

d. Reflection : this stage of learning is a resume of the whole learning activity. In this stage, the students have the opportunity to reflect on what they have learned in the classroom. By all means, the teachers' task is to assess the extent of learning. Reflection or resume activities may involve a group discussion where the instructor asks students to make presentations or explain what they have learned. As an alternative, they can make an individual writing activity in which the students write a summary of the learning outcomes. Additionally, the resume activity can also be a quick quiz where the teacher provides some questions based on the content of the object. An important point to remember with reflection is that teachers need to give opportunities for students to express what they have learned in the classroom.

e. Extension :Although the learning activity has finished, it does not mean that all students are able to use what they have learned. In that case, the teachers have to do the continuing action that supports the continued learning of the students that is the extension model of learning. The extension stage is an activity where the teacher presents activities that can do following the lesson to reinforce and extend the learning. In other words, the extension activities is the teachers'

activity to give homework to the students. Extension activities may include the provision of supplementary reading materials, resuming the next material or some questions for exercise.

4. Research Methodology

This study is using pre-experimental method. The research design of this study is using one-group pretest-posttest [8]. With these designs, the participants are the students of an experimental class without comparison. In the design of one-group pretest-posttest single group of subjects were given a pretest (initial test), treatment (X), and posttest (final test). The participant of the pretest and posttest is same but given in a different time. The form design as shown in Table 1.

Table 1. Research design one-group-pretest-posttest

Pretest	Treatment	Posttest
O_1	X	O_1

Information :

O_1 = Pretest and posttest creative thinking skills

X   = Treatment approaches ICARE Approach

The participants of this study are students in ten grades in one senior high school in West Java the second semester of the 2015/2016 academic year. And, the sample of this study is class X.6 consisting of 32 students. In the process of school selection is using the random sampling technique.

5. Findings And Discussion

The findings in the study include the initial capability test, final capability test, and the average value of N-gain normalized creative thinking skills, as presented in Figure 1.
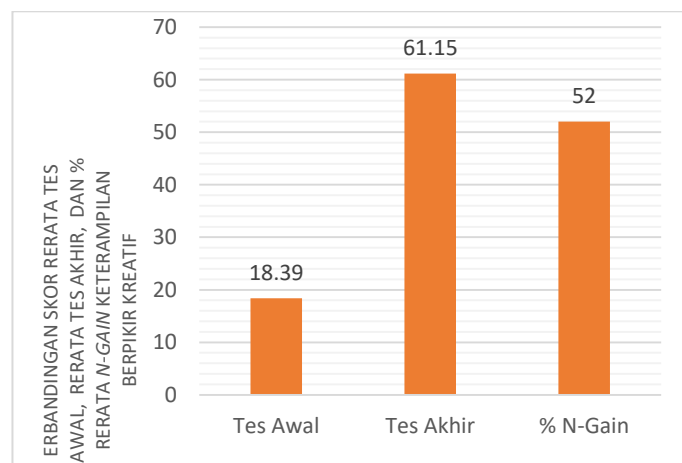

Figure 1. Diagram of average initial test, final test average, and average of normalized Gain scores <g> on creative thinking skills tests

This study was conducted to discover an increase in creative thinking skills after ICARE learning approach implemented in the learning process. In general, students' creative thinking skills increased with middle category. It is shown in the results of the data analysis that was illustrated in Figure 1, the average gain scores $\langle g \rangle$ were normalized. As can be seen on the diagram, it showed the creative thinking skills is in amount of 0.52. The result of the data analysis when it confirmed to the category of Hake [9], the average scores of the normalized gain is classified into medium category. In the initial tests of students' creative thinking skills is in the amount of lower average. On the other hand, once ICARE approach learning has been implemented, the average score increased. This indicates that the ICARE approach can increase creative thinking skills.

Based on the analysis of data showed that the average score of normalized gain $\langle g \rangle$ creative thinking skills on dynamic electrical material for each indicator as in Figure 2.
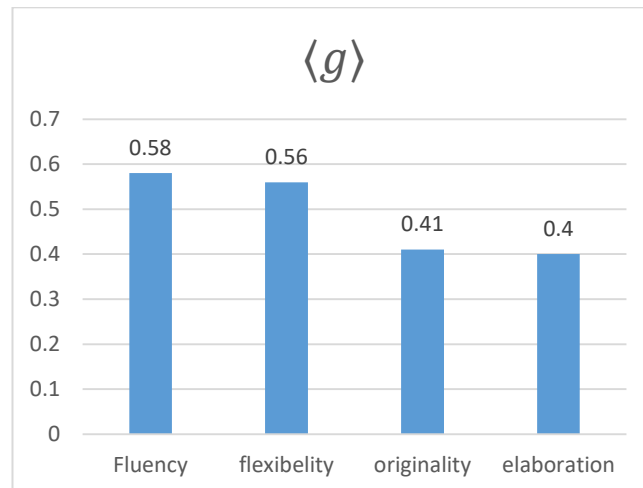

Figure 2. Comparison chart $\langle g \rangle$ Creative thinking skills indicator

The increase of students' creative thinking skills, in all the indicators based on the criteria of normalized gain [9], is in the medium category. This shows that the students' creative thinking skills in all four main indicators generally increased with medium category after the teachers implemented the ICARE approach in the learning process, especially in learning physics. It is in line with the results of a research conducted by Maskur [10] which states that learning Math with ICARE approach can actually enhance the creative thinking skills of students in the three-dimensional material.

6. Conclusion

Based on the results of the study and data analysis has been done, then it can conclude the that :
1. Implementation of ICARE approach can further enhance creative thinking skills high school students of class X for the dynamic electricity material.
2. The average students' creative thinking skills is in medium category.

7. References

[1]   Treffinger D J 1995 *Educational Psychology Review* **7**(3) pp 301-12
[2]   Hajiyakhchali A 2013 *Social and Behavioral Sciences* **84** pp 549 – 52
[3]   Bilal and Al-Khatib 2012 *American Int. Journal of Contemporary Research* **2**(10)
[4]   Krulik S and Rudnick J A 1996 *The New Sourcebook for Teaching Reasoning and Problem Solving in Junior and Senior High School* (Boston: Allyn and Bacon)
[5]   Torrance E P and Safter H T 1999 *Making the Creative Leap and Beyond* (Buffalo, NY: Creative Education Foundation Press)
[6]   Hoffman B and Ritchie D 1998 *Society for Information Technology & Teacher Education International Conf.* pp 119–23
[7]   DBE3 2006 *Matematika Untuk Kehidupan, Pembelajaran dan Pekerjaan* (Jakarta: USAID DBE3 Life Skills for youth)
[8]   Millan Mc J 2001 *Research in Education a Conseptual Introduction* (New York & London: Longman
[9]   Hake R R 1999 *Analyzing Change/Gain Score.* [Online]
[10] MaskuR A dkk 2012 *Journal of Primary Educational* **1**(2) pp 85-90