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The Effectiveness of ICARE Learning Model in Improving Students' Critical Thinking Skills and Collaboration Skills

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Abstract: The aim of this study was to know the effectiveness of the ICARE learning model in improving students' critical thinking skills and collaboration skills. The type of research conducted in this research was classroom action research. In this study, there were three stages of data collection namely planning, implementation, and data analysis which were analyzed using descriptive statistics. The research instrument used was a critical thinking skill test in essay form, an observation sheet for teacher and student activities in learning, a teacher ability observation sheet, a student response sheet, and an observation sheet for students' collaboration skills. The result showed that the ICARE learning model was effective in improving students' critical thinking skills and collaboration skills. The result of students' responses to the ICARE learning model was also very positive. This positive response showed that students were very enthusiastic about the learning presented and make it easier for students to understand the material.

Keywords: ICARE learning model; Critical Thinking skills; Collaboration skills

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Introduction

The first goal of physics lessons is to understand how natural events can occur. To solve problems related to everyday life in physics lessons, strong reasoning and understanding of concepts is required. Within the framework of the 2013 curriculum, the purpose of learning physics is to master concepts and principles and have the skills to develop knowledge and self-confidence as a provision to continue education at a higher level and develop science and technology.

Based on the objectives of learning physics, the ability to think critically becomes one of the important assets to be able to answer the existing problems. Machin, (2014) said that thinking skills need to be trained and developed during learning, because they are the basic capital in facing the challenges of the world of work and the community environment.

Critical thinking skill is one of the thinking skills that can be developed and trained. Critical thinking ability is an ability that is very essential and functions in all aspects of life (Ahmatika, 2011). According to Dwyer, (2014), critical thinking is reflective thinking, a complex metacognitive process and involves several skills such as analyzing, evaluating, and inferring which aims to make logical decisions about what to do in solving a problem.

In addition to critical thinking skills that must be possessed by students in the 21st century, collaboration skills are also needed. Collaboration is also defined as the ability to work flexibly, effectively and fairly with others to complete a collective task. Purwaaktari, (2015) suggests that collaborative is a mutually beneficial learning relationship and a reciprocal relationship occurs which promotes social closeness that develops students' knowledge and understanding. This collaborative method gives students the responsibility to study the material and describe its content in a group without teacher intervention (Siberman, 2004). In this case the teacher is only a facilitator in the learning process.

Based on the results of the Trends in Mathematics and Science Study (TIMSS) and Program for

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International Student Assessment (PISA) assessments, the results were unsatisfactory. In 2016, Indonesia was ranked 36 out of 49 for the TIMSS study results while Indonesia's PISA results were ranked 69 out of 76 countries (TIMSS & PRILSS, 2016). From the results of the assessment, it can be seen that the critical thinking ability of Indonesian students is still very low.

This fact is also supported by the results of interviews with some physics teachers that the learning model that is often used in learning is conventional. In addition, teachers rarely train students' critical thinking skills through more varied learning models during the learning process. This has an impact on the low average value of students' daily tests. Based on the observations, students did not show good collaboration skills. The average collaboration skills of students in the initial observation is still relatively low, that is 38.40. Le, et al (2018) explained that collaboration-based learning can improve students' collaboration skills. However, from previous research, no one has used a learning model that has flexibility in designing learning according to student needs.

One alternative effective learning model to train and develop students' critical thinking skills and collaboration skills is the ICARE model. The ICARE learning model is a model that consists of five stages, namely Introduction, Communication, Application, Reflection, Extension (Dwijayani, 2018). The learning process of the ICARE model is a learning process that constructs its own knowledge. The learning process that constructs its own knowledge can motivate students to have a passion for learning, besides that it can improve cognitive abilities and train higher-order thinking skills, one of which is critical thinking.

In the learning process, ICARE focuses on working skills so that it benefits both students and teachers (Chaiphugdee, 2019). The ICARE model provides students to learn more actively and directed based on the phases in the ICARE learning model (Anagnostopoulu et al., 2010). Learning physics using the ICARE model is very interesting because the time for each stage is very flexible, according to the needs of the researcher. This model provides an opportunity for teachers to be able to change students' learning experiences through emphasis at each stage (Byrum, 2013).

Many studies have shown that the use of ICARE learning model has a positive impact. Several studies that use the ICARE learning model are Salyers, et al (2010). They applied this model to nursing students to evaluate and see the level of student satisfaction in using the framework. Amelee and Lincoln, (2010) use ICARE's steps in Better Teaching and Learning (BTL) learning to make students happier in learning and teachers to become active motivators and facilitators. Maria, (2017) suggests that there is a significant difference in English learning outcomes before and after the ICARE learning model is applied, namely an increase in student learning outcomes.

Another research result from Siahaan et al. (2020) is that there is an increase in collaboration skills when the ICARE learning model is applied. Based on several studies on the advantages of the ICARE model, author are interested in examining the effectiveness of the ICARE learning model on students' critical thinking skills and collaboration skills. Author try to provide an alternative ICARE learning model that is not only applied to train cognitive skills but also to improve collaboration skills.

Method

The type of research conducted in this research is classroom action research. According to Kunandar (2008), classroom action research is carried out through a dynamic and complementary process consisting of planning, action, observation and reflection. The detail of classroom action research flowchart can be seen in figure 1.

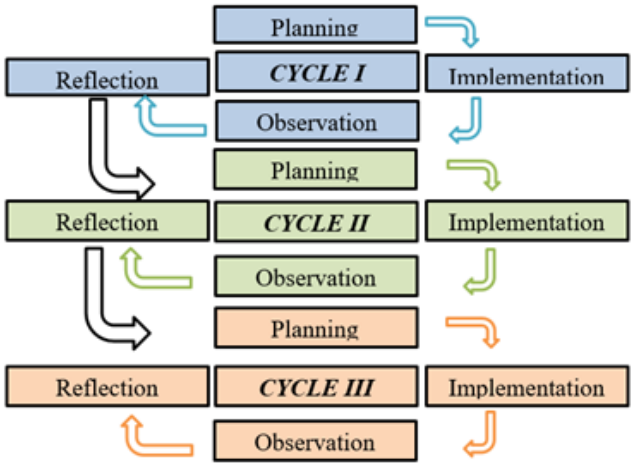

Figure 1. Research Flowchart

The subjects of this study were students of class X, amounting to 36 people. In this study there are three stages of data collection namely planning, implementation and data analysis.

At the planning stage, the activities carried out are compiling or preparing subject matter, compiling data instruments and compiling a lesson plan (LP). While at the implementation stage, the activities carried out were giving a pre-test, teaching and learning activities and data collection.

At the data analysis stage, the data collected during the learning process such as teacher and student activities and student learning outcomes. The data were analyzed by using descriptive statistics that is percentage of achievement formula according to the assessment guidelines with the formula 1.

$$P = \frac{F}{N} x100\% \quad (1)$$

Explanation:
P = Percentage to be calculated
F = Total score obtained
N = Ideal score

The research instrument used was a critical thinking skill test in the form of a description, an observation sheet for teacher and student activities in learning, a teacher ability observation sheet, a student response sheet and an observation sheet for student collaboration skills.

Result and Discussion

In the first stage, namely planning, the research instrument was made in the form of a description based on indicators of critical thinking skills. After being compiled, the test questions were validated by several experts and the average value of the assessment aspect was 4.80 out of a maximum score of 5.00. So the test questions designed were valid.

Validation Result of Learning Tools And Research Instrument

Learning tools and research instruments that have been validated by experts are briefly presented in Figure 2.

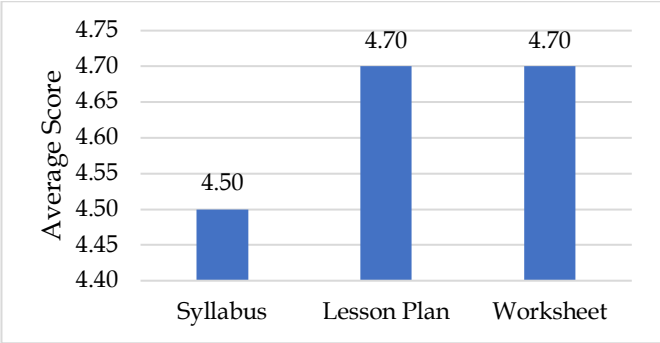

Figure 2. Validation result of learning tools and research instruments

Based on figure 2, the syllabus that has been designed is valid with an average score of 4.50 out of a maximum score of 5.00 in all aspects of the assessment. The percentage of correctness of the syllabus with aspects of competency standard assessment is 20.00%, material selection is 20.00%, suitability of activities is 22.00%, media is 18.00%, and guidelines for preparing lesson plans are 20.00%.

Based on the lesson plan that has been designed, it is valid with an average score of 4.70 from a maximum score of 5.00 in all aspects of the assessment. The percentage of lesson plan truth with aspects of lesson plan identity assessment is 12.00%, basic competencies and indicators are 10.00%, learning objectives are 12.00%, teaching materials are 10.00%, learning methods are 12.00%, learning activities are 11.00%, conformity with competency achievement by 10.00%, media by 11.00%, and language by 12.00%

Based on the worksheet that has been designed, it is valid with an average score of 4.70 from the maximum score in all aspects of the assessment. The percentage of worksheet truth with aspects of worksheet format assessment is 36.00%, worksheet content is 36%, and language is 28.00%. The Photos of research implementation can be seen in Figure 3.

Figure 3. Photos of research implementation

Analysis Result of Teacher and Student Activities

Observation of teacher and student activities is carried out while teaching and learning activities are taking place. This activity is observed by observers by filling out the observation sheet provided. The activities of teachers and students in cycle I, cycle II and cycle III can be seen in Figure 4.

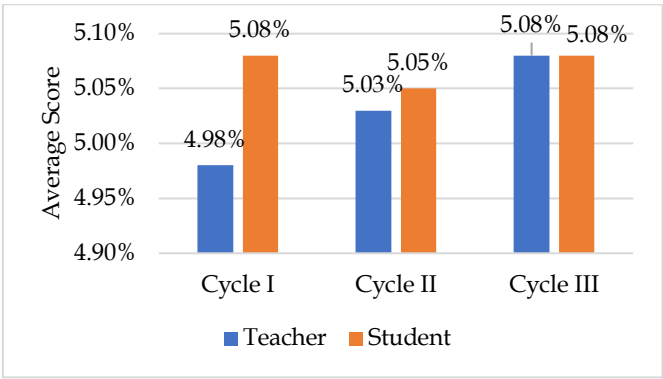

Figure 4. Analysis result of teacher and student activity

Based on Figure 4, there are differences in each cycle. In the first cycle, it shows that the percentage of teacher and student activities in the implementation of learning is mostly the same. In this first cycle, the preliminary activities have been in accordance with the stipulated time allocation. In the core activity there are three activities that are not in accordance with the time allocation set, including activities when explaining the

material briefly, when the teacher divides students into groups to conduct experiments and when the teacher guides students in processing data and answering questions on the worksheet. In the closing activity, there were two teacher and student activities that were not in accordance with the predetermined time allocation, namely when the teacher gave students the opportunity to ask questions and when the teacher gave a post-test.

In the second cycle, the percentage of teacher and student activities in the implementation of learning is mostly the same. In this cycle, there were only three teacher and student activities that were not in accordance with the set time allocation. Activities that are not appropriate are when dividing groups, when guiding students to process data and when giving students the opportunity to ask questions.

The discrepancy in cycle I and cycle II was caused by several reasons, that are: students were still difficult to manage when forming groups, the teacher explained the worksheets too quickly and briefly, then students took too long to think about the answers to other students' questions and worked too much on the questions given so that the time spent was more long in this activity.

In third cycle, it shows that the percentage of teacher and student activities in the implementation of learning is in accordance with the specified time allocation. This means that teachers and students have been able to optimize the use of learning time so that it will affect the improvement of students' critical thinking skills and collaboration skills as well as the teacher's ability to manage learning.

Analysis Result of Teacher's Ability to Apply the ICARE learning Model

In addition to observing the activities of teachers and students, the researchers also observed the skills of teachers by filling out observation sheets in managing learning by applying the ICARE model. The results of observing the teacher's ability to manage learning in cycle I, cycle II, and cycle III can be seen in Table 1**.**

Table 1. Analysis result of teacher's ability in applying ICARE model

	Cycle I	Cycle II	Cycle III
Introduction	2.90	3.40	3.70
Core activity	2.50	3.10	3.60
Closing activity	2.80	3.30	3.80
Class condition	2.00	3.00	3.50
Average score	2.50	3.20	3.70
Category	Medium	Good	Very good

Based on the results in Table 1, it can be concluded that there is an increase in the ability of teachers to manage learning by applying the ICARE model in each cycle, where the third cycle gets the highest score. This shows that the teacher's ability to manage learning using the ICARE model is very good. There are several influences given by the teacher, namely the teacher has succeeded in guiding students in carrying out learning by applying the ICARE model, the teacher has been able to optimize the time allocation, students become more active in asking and answering questions from the teacher and being more active in groups. Overall there have been positive changes in learning so that it can be said that the practicality and implementation of learning is going well.

Students' Critical Thinking Skills

Pre-test and post test conducted to know the improvement of students' critical thinking skills by using ICARE learning model. Pre-test are given before the ICARE learning model applied, while the post test is given after ICARE learning model applied especially in third cycle (cycle III). The post test is given in third cycle because that is the last cycle where the teacher's ability to manage learning in third cycle obtained a very good category. The results showed that students' critical thinking skills have increased. The improvement of students' critical thinking skills can be seen in detail in Figure 5.

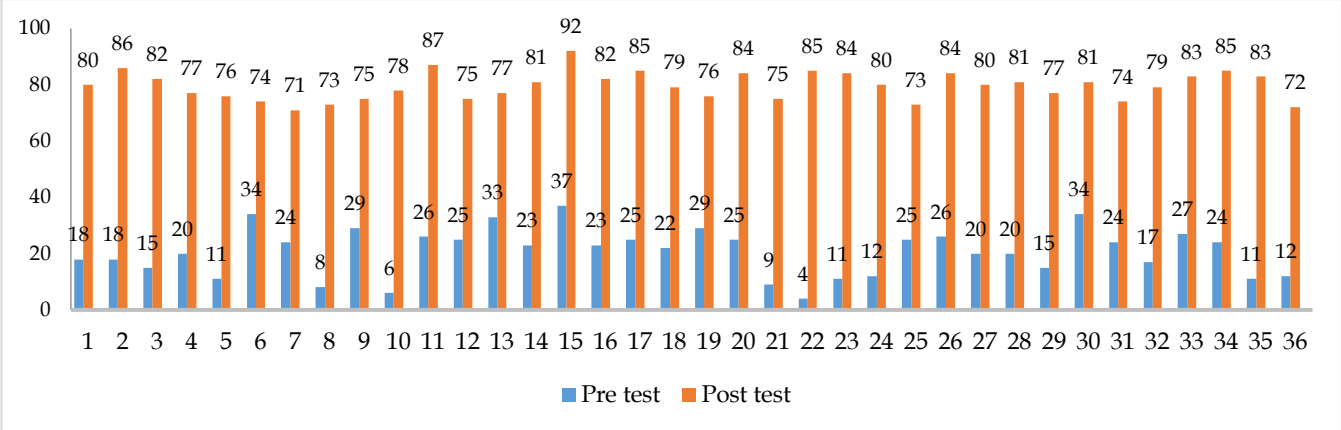

Figure 5. Pre-test and post-test value of students' critical thinking skill

Based on Figure 5, it can be seen that the results of the critical thinking skills test have increased after being given treatment using the ICARE learning model. There are thirty students who have reached the Minimum Criteria of Mastery Learning (MCML) so that it is said to be complete. There were only six students who did not complete because they had not reached the Minimum Criteria of Mastery Learning (MCML), so that classical completeness was obtained by 83.00% in the very effective category. These results are also reinforced by Muharti (2016) which states that the ICARE learning model can improve students' cognitive abilities and critical thinking skills.

The improvement of critical thinking skills during the post test was caused by the implementation of the ICARE learning model where students are given problems in the real world context which is open ended to be solved by using the concepts they have gained at the connection and introduction stages. Based on these results, it can be concluded that the ICARE learning model is effective in improving students' critical thinking skills.

Student Responses to ICARE Learning model

Based on the results of research and data analysis, it can be seen that the students' responses to the learning process by applying the ICARE learning model are all very good. In detail can be seen in Figure 6.

The diagram in figure 6 explains that most students are happy with the learning process by applying the ICARE model. In addition, students' responses to the ICARE learning model are also very positive. This positive response shows that students are very enthusiastic about the learning presented. This can motivate students to increase their attention and make students involved in a fun learning experience. The results of this study are also in line with Asri, et al (2016) who combined the ICARE learning model with science magic which showed a profile of students' positive attitudes.

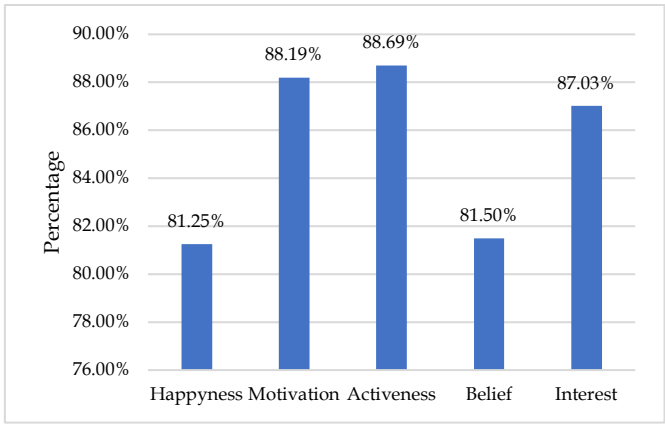

Figure 6. Percentage of students' response questionnaire

Result of Collaboration skills

The indicators of collaboration skills used in this study are 15 indicators including: 1) working productively with a group of friends; 2) participate and contribute actively; 3) balance in listening and speaking; 4) demonstrate flexibility and compromise; 5) work collaboratively with different types of people; 6) respect the ideas of others; 7) demonstrate the skill of taking one view or perspective; 8) appreciate the contribution of each group member; 9) matching tasks and works by group; 10) work with others to make decisions; 11) participate respectfully in discussions; 12) committed to putting group goals first; 13) taking into account the interests and needs of the larger group; 14) work together to solve problems and generate new product ideas; 15) shared responsibility for getting the work done (Greenstein, 2012). The collaboration skills are measured in every cycle. The results of the research from cycle I, cycle II and cycle III can be seen in table 2 and figure 7.

Table 2. Comparison of Collaboration Skill in Cycle I, Cycle II and Cycle III

Criteria		Cycle I		Cycle II		Cycle III	
Interval	Qualification	Frequency	Persentage (%)	Frequency	Persentage (%)	Frequency	Persentage (%)
51-60	Very capable	4	11.00	18	50.00	32	89.00
39-50	Capable	15	42.00	9	25.00	1	3.00
27-38	Less capable	17	47.00	9	25.00	3	8.00
15-26	Not capable	-	-	-	-	-	-
Total		36	100.00	36	100.00	36	100.00

Based on the data analysis diagram above, it can be seen that there is an improvement in student collaboration skills from cycle I where students are still less interested in collaborating. After using the ICARE learning model, collaboration skills increased in both cycle II and cycle III. In the first cycle (cycle I) it can be seen that students are still lacking in collaboration skills. When using the ICARE model in cycle II, it can be seen that 18 students (50.00%) met the collaboration skills indicator by getting an average score of 4 and 3 or very capable of collaborating. Meanwhile, 9 students (25.00%) met the indicators of being able to collaborate. In the

implementation of the third cycle (cycle III) using the ICARE learning model has increased due to improvements from the second cycle. In cycle III of 36 students, 89.00% of students were categorized as very capable of collaborating. On average, students get scores on 15 indicators of collaboration skills so it can be concluded that the use of the ICARE learning model is effective in improving students' collaboration skills.

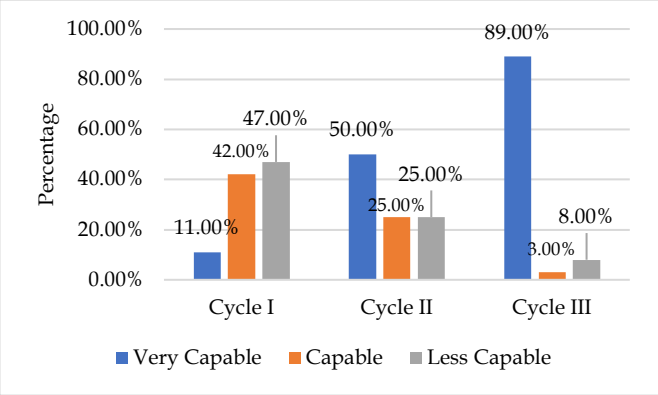

Figure 7. Diagram comparison of Collaboration Skill in Each Cycle

This results also reinforced by research of Oktavia (2021) that states the ICARE learning model is effective in improving students' communication and collaboration skills in science learning. With increased collaboration skills, students can interact well with each other's knowledge sharing (Le et al, 2018).

The improvement of collaboration skills in third cycle (cycle III) caused by the teacher has succeeded in guiding students in carrying out learning by applying the ICARE model so that students are able to communicate to express their ideas while constructing their own knowledge better; At each stage of ICARE students are led to be active in solving problems with their group friends so that they can improve their collaboration skills. Thus, if students' collaboration skills increase, then the ability to understand students' concepts will increase so that it will have an impact on increasing critical thinking skills and students' learning outcomes.

Conclusion

The Introduction, Connection, Application, Reflection and Extension (ICARE) learning model has been applied to physics learning in senior high school to enhance students' critical thinking skills and collaboration skills. Based on the result of research, it can be concluded that ICARE learning model was effective in improving students' critical thinking skills and collaboration skills. Teachers and students have been able to optimize the use of learning time so that it will affect the improvement of students' critical thinking skills and collaboration skills as well as the teacher's ability to manage learning. In addition, students' responses to the ICARE learning model are also very positive. This positive response shows that students are very enthusiastic about the learning presented and make it easier for students to understand the material.

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