# The Effect of the ICARE Learning Model on Student Computational Skills

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**ABSTRACT**

The purpose of this study is to determine the effects of the ICARE learning paradigm, which stands for Introduction, Connection, Application, Reflection, and Extensions, on the computational thinking skills of fifth graders at SDN Tamansari 1. The study was carried out by fifth graders at SDN Tamansari 1. A quantitative research experiment, this kind of investigation The subjects of the study were the classes VA and VB. In this study, Class A functioned as the experimental class and Class B as the control class. The test used in this study is a recognized evaluation of computational thinking skills. In this study, the analysis method used was the t test with a 0.05 significance level. The study's final findings demonstrate that, utilizing the ICARE model, students' computational thinking skills have an average value of 72.06, which is greater than the conventional model's 60.67 average. The study using the SPSS t test yielded the following results for the hypothesis test: sig. (2-tailed) = 0.003 0.05, tcount = 3.161, and table = 1.674. In light of this, it can be said that the ICARE model has an impact on the computational thinking skills of fifth graders at SDN Tamansari.

***Keywords:*** *ICARE Model (Introduction, Connection, Application, Reflection, Extensions), Computational Thinking Skill*

## 1. INTRODUCTION

National education was established based on Pancasila and the Constitution of the Republic of Indonesia in 1945 to educate the nation's life while shaping the character and civilization of a dignified nation. Human potential can be directed towards higher self-development through education. Many aspects of contemporary life need to be improved, from the way things are done to the way people think. By providing knowledge and skills to the younger generation, which is required to be more imaginative, competitive, and cooperative,[1]

According to the 2018 Program for International Student Assessment (PISA) scores from the Organization for Economic Cooperation and Development (OECD), Indonesia continues to have weak reading, math, and science skills; literacy and numeracy are two areas targeted for improvement. Compared to other countries, Indonesia's achievements are still at the bottom of the list. This can be seen from Indonesia's performance in 2018, which ranked 74th out of 79 competing countries. [2]. PISA places a focus on 21st-century competencies that enable integration with the education system. According to the OECD publication "The Future of Education and Skills: An OECD 2030 Framework," 21 countries lack curricula tailored to meet the future demands of the industry, particularly in the field of literacy (reading). The 21st century industry actually requires a way of thinking that is analytical, imaginative, research-based, proactive, informed, systematic, and reflective. [3]

Based on the affirmation mentioned above, researchers argue that PISA scores can be improved starting with the first education students receive, namely elementary school. The PISA exam is a solution for quality primary school education and equal access for elementary school students because it does not significantly change Indonesia's ranking every year. The ICARE (Introduction, Connection, Application,


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Reflection, and Extensions) learning paradigm is the cornerstone of every literacy indicator or domain measured by PISA, such as reading literacy (language), mathematics, and science. By enabling students to apply and practice what they have learned before, the ICARE learning paradigm allows students to make connections between what they currently know and new knowledge they do not yet know. The phases (Introduction, Connection, Application, Reflection, and Extension) of activities completed by students after lectures are completed are the five stages of the ICARE learning model.[4] Each student's ability to understand the material when studying in class varies. Some students find it difficult to absorb lessons, while others find it simple. According to Fina in her journal, learning should be student-centered and not just teacher-centered when using the ICARE approach to allow students to participate in the learning process. With it, students can work together or independently to solve a problem. Students' thinking abilities will develop as a result of problems that arise during the learning process, and they will be able to identify the best course of action. [5] Every student should have skills related to 21st century learning because of how fast technology and science are evolving. Students must also have the ability to reason computationally, which is defined as the act of solving problems sequentially by using many steps to identify answers to pre-existing problems.[6]

Computational thinking is the capacity to detect real-world events and offer a range of workable solutions to the problem under investigation.[7]. This implies that the goal of computational thinking is to assist students in creating mental models that will enable them to solve problems by generating intelligent solutions based on the information and knowledge they have acquired. Given that computational thinking is an important part of problem solving in contemporary educational environments, the importance of skills in this area is established. Seymour Papert coined the word "CT" for the first time in 1980 and 1996. Students should benefit from using computational thinking to help them make decisions and solve challenges. The ability to reason computationally has not been fully acquired by grade 5 students, according to an interview I conducted with Mrs. Inastuti Lestari, S.Pd on Thursday, November 24, 2022, as a grade V teacher at SDN Tamansari 1. Because grade V students are still learning using traditional teaching methods, they do not yet have the basic skills needed to tackle problems that take the form of story problems. Students must be able to answer problems that have several stages. In addition, teachers note that despite students' low interest in reading, it is still difficult to understand their problems. Only PowerPoint presentations or instructional films are used by teachers to provide material during class, and only reviews are conducted. Based on the interview of grade V teachers at SDN Tamansari 1, it turns out that they still don't know computational thinking skills, so students have never been taught CT well. In the learning process of PPKn at SDN Tamansari 1, in the material entitled "Rights and Obligations," students in everyday life have enough to understand the concept of rights and obligations, but only the basics. They have not used computational thinking skills in answering questions, so when facing quite complicated problems, they are still confused. Therefore, researchers are quite interested in examining how ICARE learning affects the computational thinking skills of SDN Tamansari 1 students in grade V.

## 2. METHOD

An experimental quantitative research model was used in this study. Experimental research is described as a research method with the aim of evaluating the influence of a certain action or treatment from student behavior or testing hypotheses about the influence of a certain action when compared to other actions [8]. To find out whether the ICARE learning model can affect students' computational thinking skills and how it compares with other models, an experiment was conducted in this study. Data collection is essential for a study, just as it is for data collection in all forms used by researchers, such as observation, tests, and documentation. After the data is collected, it is further analyzed. This data analysis is done to make the research easy to understand. Priority tests, such as normality and homogeneity tests, are used by researchers to ensure that the data is accurate. The t test is then used to check the hypothesis.

## 4. RESULTS AND DISCUSSION

"The Effect of ICARE *(Introduction Connection Application Reflection Extensions) Learning Model* on *Comptational Thingking Skill* of Class V Students of SDN Tamansari 1" is the title of this study. This study aims to ascertain whether the model has an impact on the computational thinking skills of SDN Tamansari 1 students in class V. The learning model used by the researcher is the ICARE learning model and compared to conventional learning models.

The first stage in the research process is to observe the situation in the school. These early observations are intended to help researchers identify problems facing schools. The researcher then makes a title and compiles a research proposal. Data from the pretest, collected at the research site and attached to appendix 16, will then be examined. The findings of the hypothesis test analysis showed that the two classes were homogeneous, regularly distributed, and had almost identical grade point averages. In other words, both classes start with almost the same ability, making them both suitable as

research objects. The experimental and control classes are the classes that will be used in this study. Class B is used as an experimental class and will use the ICARE learning model, while Class A is used as a control class that will use the traditional model and not be subjected to the ICARE model.

The five stages of learning are introduction, connection, application, reflection, and extension in the ICARE learning model, which is student-centered and not just teacher-centered. This ICARE learning style has a number of benefits, including increased student activity, the development of critical thinking skills, the ability to analyze problems, and increased student confidence. Thus, it is anticipated that this model will be able to cultivate students' capacity for computational thinking. The development of research instruments is the next stage. Researchers develop research tools, which are then validated by validators. The tools created include student worksheets (LKS), learning process plans (RPP), exam questions contained in Appendix 1, and observation sheets. The next stage is to carry out research-related tasks. Researchers who conducted the study were the first to see learning activities using the ICARE (Introduction Connection Application Reflection Extensions) model with the help of observers. Annexes 19 to 21 include the results of observational activities. The implementation of teacher learning in experimental classes using the ICARE (Introduction Connection Application Reflection Extensions) model from meeting I to meeting III was determined 100% based on observations made by observers. This is due to the excellent implementation of teacher learning measures. Because the teacher is able to guide students to follow the learning steps that have been set, the results of observations on the implementation of learning by experimental class students from the first meeting to the third meeting amounted to 100% in the very good criteria. However, during the learning implementation, there are still some students who ask their seatmates to understand the problems. The learning process is changed when adopting the ICARE (Introduction Connection Application Reflection Extensions) model. Students who are initially less involved in the learning process engage, asking questions about concepts they don't understand and exchanging opinions during presentations. In addition, teachers assist in guiding and directing students' computational thinking as they work on individual assignments and when they ask questions about concepts that they do not fully understand. Students' computational thinking skills may begin to develop gradually as they work independently on activities and learn to solve challenging problems relevant to everyday life. Before the first meeting, a pretest or test question was carried out to find out how the initial abilities of grade V students at SDN Tamansari 1 were. After three teaching meetings, experimental and control class students completed posttest questions using the same questions from Appendix 12 at the fifth meeting. Since the spread of posttest scoring activities modifies the schedule of lessons taught in each class, it happens at different times. After that, normality, homogeneity, and hypothesis tests were carried out on the data values collected at the time of the attached posttests 22 and 23.

The researchers ran normal tests first, using the value data they had collected. Grades in the experimental class yauti, sig. = 0.200 > (0.05) and the value in the control class i.e., sig. = 0.052 > (0.05) in the normality test findings showed that the data collected by researchers from both classes were equally normally distributed. To ascertain whether both classes have the same variance or diversity, a homogeneity test is performed after the normality test. The homogeneity test results for both classes, i.e. sig value = 0.685 > (0.05), allow us to draw the conclusion that both groups are equally homogeneous or have the same variance.

The next step is for researchers to run a t-test to see if the ICARE *(Introduction Connection Application Reflection Extensions) model* has an impact on students' capacity to think computationally. Based on the results of the t-test analysis, it can be concluded that the ICARE *(Introduction Connection Application Reflection Extensions)* model has an impact on computational thinking skills in PPKn learning because the sig value. = 0.003 (0.05), tcount = 3.161, and $t_{table}$ = 1.674. The experimental class had an average computational thinking skill of 72.06, compared to 60.67 for the control group. These findings suggest that computational thinking skills were greater in the experimental class than in the control class. The following table shows changes in the improvement of computational thinking ability in the experimental class based on the findings of the examination of markers of computational thinking ability.

**Table 1** Change in the percentage of achievement of students' computational thinking skills in experimental classes

| No | Computational Thinking Capability Indicator | Experimental Class | |
|---|---|---|---|
| | | Before Action | After Action |

| | | | |
|---|---|---|---|
| 1 | Selecting important information in a story (Abstraction) | 85% | 88% |
| 2 | Solving complex problems in the story (Decomposition) | 60% | 76% |
| 3 | Develop problem-solving steps in the story (Algorithm) | 55% | 69% |
| 4 | Fix errors in stories (Debugging) | 46% | 58% |
| 5 | Summing up the solution to a problem in a story (Generalization) | 65% | 67% |

Source: Observation Documentation (2023)

The results from the table above show that students in the experimental class have shown improved computational thinking skills. Therefore, it can be concluded that teaching with the ICARE (Introduction Connection Application Reflection Extensions) approach has a considerable impact on the critical thinking skills of elementary school students. The ICARE (Introduction Connection Application Reflection Extensions) model outperforms the traditional model when examining average learning. This is because students who take part in learning activities that use the ICARE (Introduction Connection Application Reflection Extensions) method are very excited, do not feel bored, and help each other understand the information presented even though the task is completed individually. Teachers help students with problem solving as well. In addition, student groups are encouraged to study together so that members can share thoughts and tackle problems together. Due to this situation, students will find it easier to understand the subject being taught and to complete challenging tasks. ICARE (Introduction Connection Application Reflection Extensions) has a great impact and encourages students to practice more to advance their computational thinking skills. This entails pointing out findings identical to those found in research by ([9]) demonstrating that this research has a beneficial and significant impact on the application of the ICARE (Introduction Connection Application Reflection Extensions) learning model on students' capacity to think creatively. [6] with its output, namely the impact of the ICARE learning model on computational thinking skills, although gender differences do not have much effect [10] that is, with findings showing that there is variation in students' typical critical thinking skills, with the ICARE learning model influencing experimental classes and control classesthat is, with findings showing that there is variation in students' typical critical thinking skills, with the ICARE learning model influencing experimental classes and control classes.

## CONCLUSION

Based on the discussion of this study, it was determined that tcount = 3.161 and ttable = 1.674 in the t-test analysis for hypothesis testing. This means that the calculation table shows how the ICARE learning model affects the capacity of grade V students in SDN Tamansari 1 to think computationally. Students who used the ICARE (Introduction Connection Application Reflection Extensions) model had a higher average computational thinking ability compared to students who used the traditional model, which was 58.21. Therefore, it can be concluded that the ICARE (Introduction Connection Application Reflection Extensions) model has a significant effect on the computational thinking skills of grade V students at SDN Tamansari 1.

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