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IMPROVING STUDENTS CRITICAL THINKING SKILLS ON STUDENT LEARNING OUTOCOMES USING THE ICARE STRATEGY

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Abstract

This study aims to determine the level of students' critical thinking skills and train critical thinking skills of students in class X IPA SMA Swasta Taman Siswa Medan on Newton's Law material. This type of research is a pseudo experiment. The population in this study were all students of class X IPA SMA Swasta Taman Siswa Medan. This sampling uses the Total Sampling technique by taking all X IPA class students. The instruments used in this study consisted of two types, namely instruments to determine learning outcomes and activities with test instruments, the pretest value of the experimental class was 46 19 and the control class was 42.73 and after the learning was completed a posttest was given with the results of the experimental class posttest value of 85.48 and the control class of 72.73, so that there was a significant effect of the ICARE learning strategy on students' critical thinking skills on the subject matter of Newton's law.

Keywords: ICARE Strategy Learning, Learning Outcomes, Critical Thinking

INTRODUCTION

The implementation of the 2013 Curriculum and the Implementation of Merdeka Belajar is to improve students' process skills and critical thinking in learning. Process skills and critical thinking train learners to have effective and creative thinking and action skills in the abstract and concrete domains as a development through observing, asking, trying, processing, serving, reasoning, and creating independently according to their talents and interests (Kemendikbud, 2013).

The 2013 curriculum carries the theme: producing productive, creative, innovative, and affective (character) Indonesian people, through strengthening attitudes, skills, and knowledge in an integrated manner. (Mulyasa, 2015). Teachers must be able to optimally develop the potential of students through various creative learning innovations that can develop students' creativity. Life and career in the 21st century requires the ability to: 1) be flexible and adaptive; 2) take initiative and be independent; 3) have social and cultural skills; 4) be productive and accountable; and 5) have leadership and responsibility (Sani, 2017).

This 21st century learning applies creativity, critical thinking, cooperation, problem solving, community communication skills and character skills. Skilled in solving problems means being able to overcome the problems they are facing, in the teaching-learning process if students can solve these problems, it means that these students can think critically. (21st century learning itself contains critical thinking and problem-solving skills, creativity and innovation, collaboration, and communication that students must have in order to be able to face future challenges (Redhana, 2019).

Learning strategies that have the characteristics of the 2013 Curriculum are the ICARE strategies. ICARE strategies include Introduction, Connection, Application, Reflection, and Extension. Of the two strategies have similarities, namely having the same three stages in the learning process, namely connecting (connect), reflecting (reflect), and extending (extend).

Choosing the right learning strategy can affect the improvement of student learning achievement. One of the learning strategies that is appropriately applied today is ICARE, in which in the ICARE learning strategy students are given the opportunity to gain direct experience from learning by applying what they get in each learning session. (Musri, 2020).

One learning strategy that emphasizes understanding of concepts and activities to apply students' knowledge is the ICARE learning strategy, namely Introduction, Connection, Application, Reflection, and Extention (Hoffman & Ritchie, 1998: 114).

ICARE has five stages, namely Introduction at this stage explaining the outline of the content of the subject matter as a whole, the objectives achieved and the time and materials needed. Connecting at this stage explains the concepts, facts, and processes related to the subject matter to be learned (Sinuraya et al., 2020) (Sa'diyah et al., 2021).

ICARE is also directed so that students can practice their science process skills and creativity abilities to improve their cognitive abilities. ICARE learning can be done so that students are active in learning so that they can improve their cognitive abilities (Sinuraya, Panggabean and Wahyuni, 2018b); (Sinuraya, Panggabean and Wahyuni, 2018a) (Habibollah, 2010).

Learning activities can be effective if the goals that have been set can be achieved properly. Meaningful learning is intended to achieve learning effectiveness, because with meaningful learning it is possible to transfer learning through understanding. (Mulyasa, 2006).

Based on the results of preliminary studies conducted by researchers at Taman Siswa Medan Private High School. This school uses the K-13 curriculum. SMA Swasta Taman Siswa Medan has 12 classes. The number of teachers at SMA Swasta Taman Siswa Medan is 27 people and 2 employees. There is only one physics teacher, namely Mrs. Nyi. Darvini Rezeki Lubis, S.Pd. observations have been made at Taman Siswa Medan Private High School through interviews. Students in class X IPA lack critical thinking skills and activeness and critical thinking skills still tend to be low (only 50%) and the teacher always interacts with students to train or to stimulate student responses at the beginning of each lesson, and at the end of the lesson the teacher always gives students the opportunity to summarize the results of the lesson.

In this study, researchers will apply the ICARE strategy so that it pays more attention to the learning process of students and the selected material, namely Newton's Law. Therefore, researchers will conduct a study entitled "Improving Students' Critical Thinking Ability on Learning Outcomes Using the ICARE Strategy".

METHOD

This research was conducted at Taman Siswa Medan Private High School in class X specialization in natural sciences and its implementation in the second semester of the 2022/2023 academic year which is located at Jl. Tilak / Singosari No.11 Medan, Kec. Medan Area Medan City.

The technique used to collect research data is by conducting tests to students in the form of pre-test at the beginning of learning and post-test at the end of learning. In this study, which looks at the final ability of students after being given treatment. The design can be seen in table 1.

Tabel 1. *Two Group Pretest-Posttest Design*

Class	Pretest	Treatment	Posttest
Eksperiment	T1	X	T2
Control	T1	Y	T2

Description:

T1 = Pretest given to experimental class and control class

T2 = Posttest given to experimental class and control class

X = Learning with ICARE strategy

Y = Learning by applying conventional learning

This type of research is quais experiment. The population in this study were all students of class X natural science specialization of SMA Swasta Taman Siswa Medan. This sampling uses the Total Sampling technique by taking all X science class students, namely X IPA 1 (as an experimental class) totaling 21 people and X IPA 2 class (as a control class) totaling 22 people. The instrument used in this study consists of two types, namely instruments to determine learning outcomes and activities using test instruments. Then given different treatments, the experimental class with ICARE Strategy learning and the control class with conventional learning.

The data obtained in the form of normality, homogeneity, and hypothesis test results on pretest and posttest scores.

RESULTS AND DISCUSSION

Result

The data of this study are pretest and posttest scores, namely tests given to both sample classes to see the initial ability of students to learn. Before the data is analyzed, it is necessary to test the requirements of this data analysis using statistical tests (SPSS). This test includes normality test and homogeneity test of the variables in this study, namely learning outcomes and student activities in experimental and control classes. The following presents the requirements test of data analysis on both research variables.

Student learning outcomes in the experimental class by applying the ICARE learning strategy with an average pretest score of 46.19 and a posttest of 85.47 increased by 39.28. And the control class by applying conventional learning with an average pretest score of 39.09 and posttest 72.95 experienced an increase of 33.86. Testing was carried out with a pretest question instrument which amounted to 5 essay questions and a posttest question which amounted to 5 essay questions. The results of the normality test for both samples showed that the pretest scores were normally distributed where tcount did not exceed ttable and came from a homogeneous population.

Based on the results of the normality test with Kolmogorov-Smirnov on learning outcomes in the post-test of the experimental class using the ICARE learning strategy while the control class is

taught with conventional learning. So that from these results it can be in both groups normally distributed.

Tabel 2. Normality Test Value of Student Learning Outcomes Using SPSS Version 25

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Eskperimen Class	.147	21	.200*	.930	21	.138
Kontrol Class	.124	22	.200*	.937	22	.174
Eskperimen Class	.162	21	.155	.895	21	.028
Kontrol Class	.154	22	.192	.924	22	.094

Based on the results of the data analysis of the normality test with Kolmogorov- Smirnov on student learning activities in the experimental class with ICARE strategy learning, the average value of student activity is obtained and in the control class with conventional learning from these results the activity data in both groups are normally distributed.

Table 3. Normality Test Values of Student Learning Outcomes Using SPSS Version 25

Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Eskperimen Class	.155	21	.200*	.928	21	.123
Kontrol Class	.144	22	.200*	.955	22	.395
Eskperimen Class	.186	21	.055	.879	21	.014
Kontrol Class	.148	22	.200*	.904	22	.035

From the table above, the homogeneity test results of learning outcomes and student learning activities in the control class with conventional learning obtained Sig (0.312) > 0.05 and the learning outcomes of the experimental class with ICARE strategy learning obtained Sig (0.316) > α = 0.05. So that the results of the homogeneity test with the Levene test method of learning outcomes data from both groups have the same variance (homogeneous).

From the research data, we can also see the results of the activity homogeneity test of the experimental and control classes. Activity in the control class with conventional learning obtained Sig (0.324) > α = 0.05 and in the experimental class, obtained Sig (0.429) > α = 0.05. So the results of the homogeneity test with the Levene test method on student learning activities in both classes have the same variance (homogeneous).

After the data on learning outcomes and student activities have met the requirements, namely that they are normally distributed and homogeneous, then hypothesis testing is carried out. Hypothesis testing was conducted to determine whether there was an effect of the ICARE strategy on students' critical thinking skills in class X IPA SMA Taman Siswa Medan. Hypothesis testing uses the SPSS data processing application with the Independent t test method. The data compared are data on learning activities and critical thinking of students in experimental and control classes.

Table 4. Hypothesis Test Results of Student Learning Outcomes with SPSS Version 25

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
							95% Confidence Interval of the Difference	
		T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Posttest	Equal variances assumes	5.426	41	.000	12.749	2.349	8.004	17.494
	Equal variances not assumes	5.447	40.505	.000	12.749	2.341	8.020	17.478

Table 5. Student Activity Hypothesis Test Results with SPSS Version 25

Independent Samples Test							
	t-test for Equality of Means						
						95% Confidence Interval of the Difference	
T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper

Posttest	Equal variances assumed	4.678	41	.000	11.807	2.524	6.710	16.905
	Equal variances not assumed	4.697	40.332	.000	11.807	2.514	6.728	16.886

From the data on the results of testing the hypothesis of learning outcomes obtained with the value of tcount < ttable, namely (4.678> 1.683), in accordance with the criteria for testing the hypothesis If tcount> ttable then H0 is rejected, Ha is accepted, then from the t value data on learning outcomes it can be stated that there is a significant effect on student learning outcomes.

The results of student activity obtained the average value of student activity in the experimental class using the ICARE learning strategy and the control class with conventional learning, namely (5.426> 1.683), in accordance with the hypothesis testing criteria by comparing the tcount value with the ttable. If tcount < ttable then H0 is accepted, Ha is rejected. If tcount> ttable then H0 is rejected, Ha is accepted, then from the t value data on student activity it can be stated that there is a significant effect on student activity.

Table 6. Effect Test Results with Effect Size Student Learning Outcomes

	Class	Mean	Std. Deviasi	Cohen's d effect size
Pretest	Eksperimen Class	42,38	7,81	4,83
	Control Class	39,09	9,47	
Posttest	Eksperimen Class	84,76	7,32	1,44
	Control Class	72,95	8,95	

Based on the results of the calculation of the effect size test of learning outcomes, it shows that the average pretest value for the experimental class is 42.38, the standard deviation is 7.81 and for the control class the average pretest value is 39.09, the standard deviation is 9.47 so that the Cohen's d effect size value of 4.83 is included in the high category. While for the experimental class posttest value of 84.76, the standard deviation is 7.32 and for the control class the average posttest value is 72.95, the standard deviation is 8.95 so that the Cohen's d effect size value of 1.44 is included in the

high category. So it can be concluded that the use of the ICARE strategy is effective for improving student learning outcomes on Newton's Law material.

Table 7. Effect Size Test of Learning Activity

	Class	Mean	Std. Deviasi	Cohen's d effect size
Pretest	Eksperimen Class	46,19	8,82	
	Control Class	42,73	11,52	0,33
Posttest	Eksperimen Class	85,47	6,97	
	Control Class	72,73	7,92	1,70

Based on the results of the calculation of the effect size test of learning activities, it shows that the pretest average value for the experimental class is 46.19, the standard deviation is 8.82 and for the control class the pretest average value is 42.73, the standard deviation is 11.52 so that the Cohen's d effect size value of 0.33 is included in the moderate category. While for the experimental class posttest value of 85.47, the standard deviation is 6.97 and for the control class the average posttest value is 72.73, the standard deviation is 7.92 so that the Cohen's d effect size value of 1.70 is included in the high category. So it can be concluded that the use of the ICARE strategy is effective for increasing student learning activities on Newton's Law material.

Table 8. N-Gain Data of Student Learning Outcomes

N-Gain (%)	
Eksperimen Class	**Control Class**
73,27	54,69

Based on the results of the N-Gain test calculation of the learning score, it shows that the average value of the N-Gain learning score for the experimental class is 73.3 or 73.2%, including in the high category. Meanwhile, the average value of N-Gain for the control class is 54.7 or 54.7%, including in the medium category. So it can be concluded that the use of the ICARE strategy is effective for improving student learning outcomes on Newton's Law material.

Table 9. N-Gain Data of Student Learning Activities

N-Gain (%)	
Eksperimen Class	**Control Class**
72,05	50,01

Based on the results of the N-Gain test calculation of the learning activity score, it shows that the average value of the N-Gain learning activity score for the experimental class is 72.05 or 72.05% including in the high category. While for the average value of N-Gain learning activity of the control class is 50.01% including in the medium category. So it can be concluded that the use of the ICARE strategy is effective for increasing student learning activities on Newton's Law material.

Discussion

This study used two classes as research samples given two different treatments, namely students in the experimental class X IPA 1 by applying the ICARE learning strategy on Newton's Law material and students in the control class X IPA 2 were given treatment by applying conventional learning.

In the ICARE learning stage, researchers carry out in stages starting from:

Introduction stage: at this initial stage the researcher explains the learning objectives and outlines the learning theory so that students can understand the learning well.

This stage is also supported by the theory: (Fauziyyah, 2012).Providing apperception is a skill that needs to be learned by the teacher, because when the teacher enters the classroom for the first time is a decisive moment for the next steps.

Connection stage: at this stage the researcher connects the previous learning with the learning that will be learned, the researcher also trains students to be able to remember what are the examples of lessons related to everyday life.

Apply this stage presents a challenge for students to be able to apply the Connect stage by providing problems related to everyday life. Reflect this stage where students will reflect on what they learned and the experience gained in the Connect and Apply stage and Extend (continue) this stage where students will be allowed to be able to expand their knowledge gained by providing broader problems such as providing enrichment and improvement. (Sinuraya et al., 2018).

Application stage: at this stage the researcher invites students to do a simple practicum and discuss sample problems.

This stage is also supported by theory: This is in line with Sagala's opinion (2005: 220) which explains that the teaching and learning process with this practicum means that students are given the opportunity to experience themselves, follow the process, observe an object, analyze, prove, and draw their own conclusions about an object, situation or process. something.

Reflection Stage: at this stage the researcher invites students to reflect on the lessons that have been learned by discussing the subject matter that has been learned and after summarizing and discussing the researcher provides an opportunity for students to express their opinions or knowledge that has been obtained.

Stage Extention: at this stage even though the learning has been completed, the researcher invites students to strengthen learning with further learning by the researcher directing students to access several internet sites to be able to solve the problems discussed in the lesson.

Based on the discussion above, there are differences in student learning outcomes due to the effect of ICARE strategy learning on learning outcomes and student activity on the subject matter of Newton's Law in semester II class X IPA SMA Swasta Taman Siswa Medan.

CONCLUSION

There is an effect of applying the ICARE strategy on students' critical thinking skills, this can be seen from the learning outcomes of students and student activities in the experimental class by applying the ICARE learning strategy with an average pretest value of 42.38 and posttest 84.76 Experiencing an increase of 42.38 Pretest and posttest testing was carried out with an instrument of 5 essay questions. And in the control class by applying conventional learning with an average pretest value of 39.09 and posttest 72.95 experienced an increase of 33.86. Testing was carried out with an instrument that amounted to 5 essay questions. There is an increase in students' critical thinking skills after the application of the ICARE learning strategy (Introduction, Connection, Application, Reflection, Extention) with an independent t-test, this shows that there is an effect of applying the ICARE learning strategy on learning outcomes and improving students' critical thinking skills.

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