

# THE IMPACT OF ENVIRONMENTAL-CARE CHARACTER TO STUDENTS' CRITICAL THINKING THROUGH THE LEARNING OF SOCIO-SCIENTIFIC ISSUE (SSI) WITH PICTORIAL RIDDLE METHOD

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## Abstract

*This research was aimed to know the impact of SSI learning with pictorial method on critical thinking skills and environmental care character as well as to identify the impact of the environmental care character to students' critical thinking. This research used quasi-experimental design and its type was correlational research in which the sample was obtained by purposive sampling. The instruments used in this research were questionnaires to assess the environmental care-character and to measure students' critical thinking skills. Yet, the Pictorial Riddle method used were comic and Student Activity Sheets (SAS). The hypothesis test was done by t test and regression test. Based on the data analysis, the result of the right side of t test showed that students' critical thinking skills and environmental care character from the experiment-class were better than the control class. Then, a linear-regression test was performed, it obtained an equation  $\hat{Y} = 22,05 + 0.733 X$  with coefficient correlation as much as 0.54. It implied that there was a positive relationship between environmental-care character and critical thinking skills. Next, the data was analyzed to know the coefficient determination ( $r^2$ ) and the result was 0.29. Based on the results, it could be concluded that 29% of students' critical thinking skills was influenced by the value of their environmental-care character, while the rest (71%) was influenced by other factors.*

**Keywords:** critical thinking, environmental care character, socio scientific issues, pictorial riddle

## 1 INTRODUCTION

Human are special creature with talents and competences. Development of the talents and competences can be conducted through some learning process in education, especially elementary education (SD). One of the functions of elementary education is providing foothold to students' life related to critical thinking, reading, writing, counting, and communicating as the basic skill in daily life which can be possessed through learning process (Prastowo, 2013).

Study is one of the developmental processes of critical thinking (Jufri, 2013). The thinking skill, especially critical thinking skill, is one of ability used for solving problem in human's life. It means that critical thinking skill is needed in the elementary level of education.

Fisher (2007) defines critical thinking as evaluative thinking that includes both critic and creative, and it specifically relates to the quality of thinking or argument presented to support a faith or a sequence of acts. In order to develop the thinking skill, a learning

process should be done by emphasizing students' skill through an inquiry and correlating process between material and daily life.

Yet, the learning of inquiry and development process have not been performed maximally. It can be seen from the early observation that students' were not able to autonomously conceptualize, analyze, and correlates the learnt material to their daily life or even to the other disciplines. Commonly, science learning is only developing cognitive and memorizing skill. Therefore, it is needed a learning process that could guide the students' to find their own concept and to analyze its correlation with the other disciplines.

Critical thinking skill of a person should be balanced with attitude that represents Indonesian characters. Education seems to treat human as a robot that has no balance character between intelligence, intellectual, spiritual and emotional. Furthermore, there is Asean Economic Community (AEC) that requires Indonesian people to have strong character in facing the global challenges. However, the process of character building is expected to help teachers building students' good behavior in school so that good attitude could be created (Kemendiknas, 2010).

One of the nation's character developed in elementary education is the character of environmental care (Kemendiknas, 2010), because nowadays many intellectual people are easily to be found, but they tend to exploit and damage the environment. Future survival depends on the current lifestyle so that the sustainability of the earth of Indonesia depends on society's attitude towards the environment. Therefore, environmental-care characters building should be applied at the elementary level of education so that students are being accustomed from

their early age. If the character education is instilled early on, then the character can be embedded and well formed. Hence, the development of critical thinking must be balanced with the development of environmental-care character in order to form human beings who have global competitiveness yet have environmental concern and the character to maintain and preserve the environment.

One of the learnings that relates the materials to the daily life through inquiry process is the learning of socio-scientific issues (SSI) with pictorial riddle method. SSI is a method that analyzes and correlates science to technology which affect to the environment and socio development. SSI learning could contribute on discussion and thinking activity since it involves many points of view in studying cases (Zeidler & Bryan, 2009). Besides, SSI learning could improve students' morality which contributes to intact moral development (Fowler, et al, 2009). Meanwhile, the pictorial riddle method is one of inquiry process through quiz in pictures. It can develop critical thinking skill (Mulyasa, 2011). In addition, Masfuah (2016) has conducted a research and the result shows that pictorial riddle is able to improve students' problem solving skill, one of high-level of thinking.

Based on the explanation above, a research is needed in order to know the impact of SSI learning with pictorial riddle method towards students' critical thinking skill and environmental-care character, as well as to know how big is the impact of environmental-care character to students' critical thinking skills.

## **2 METHODE**

This research was aimed to know the impact of socio-scientific issues (SSI) learning with pictorial method on critical

thinking skills and environmental-care character, as well as to identify if there is any impact of environmental-care character to students' critical thinking skills. This research was applied to 16 kids of 3rd grade students in SD 1 Gondangmanis, Bae Kudus Regency as the experiment-class, while the 3rd grade students of SD 4 Gondangmanis as the control class. The experiment-class was given SSI learning with pictorial riddle method, while the control-class was given direct learning. The variables in this research were environmental-care character (X variable) and critical thinking skills (Y variable). The measurements of the environmental-care character were conducted by using the instrument of observation sheets and questionnaires, while the measurement of the critical thinking skills was conducted by using test instrument. The measured-value of environmental-care character was in terms of personal hygiene in the bathroom, awareness in disposing garbage, cleanliness of the classroom and school environment and the awareness of the surrounding environment (Puskurbalitbang, 2010).

In addition to environmental-care character measurements, this research also measured students' critical thinking skills that included identifying information, judging in decision-making, interpreting data, analyzing phenomena, arguing, evaluating and concluding (Fisher, 2007). This research treated 3rd grade students in form of socio scientific issues learning with pictorial riddle method by connecting nature science (IPA) and social science (IPS) concept to daily life through picture method which contained messages or guesses in form of riddle. Pictorial riddle used in this research such as comic and SAS (worksheet) which contains the material of IPA and IPS which

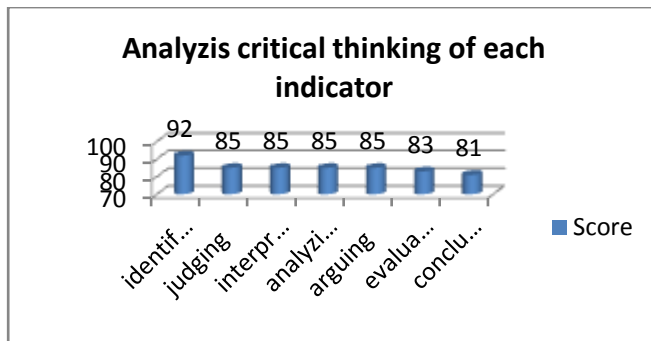
was presented through interesting pictures and stories because it connected the material with the daily life (social issue developed in society). Measurement of environmental cares was conducted at each meeting, whereas the measurement of critical thinking skills was done at the end of the meeting. After that, the data were analyzed with a simple linear regression test and then the linear regression equation as well as the coefficient correlation and the determination coefficient were determined.

Hypothesis in this research was  $H_{01}$ : the average of critical thinking skills of the experiment-class was smaller or equal to the average critical thinking skills of the control class student;  $H_{02}$ : the average value of environmental character of experiment-class was smaller or equal to the average value of environmental character of control class; and  $H_{03}$ : there was no significant impact between environmental-care character (X) and critical thinking skills (Y). Student's environmental-care character was measured by using observation sheet instrument applied at each meeting followed by questionnaire instrument consisted of 10 questions, it was given to the students at the end of the meeting. Then, the results were collaborated and analyzed in order to find out how much value of environmental-care character could score. At the end of the study, students were given post-test questions to determine their critical thinking skills. In the early stages, the data were analyzed to determine the description of each variable. The result of descriptive data analysis can be seen in Table 1.

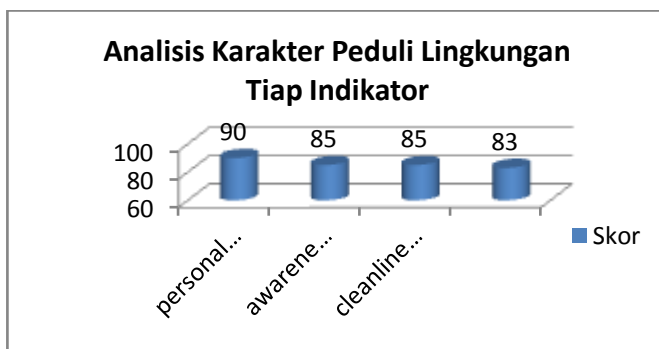
**Table 1.** The result of descriptive data analysis

Variabel	Skor Min	Skor Max	Ave- rage	Me- dian	devia- tion standart
environ- mental care character (X)	75	92	85,94	83	5,02
Critical thinking (Y)	67	95	85,44	86	6,99

In addition, descriptive analysis was used to analyze environmental-care character and critical thinking skills of each indicator. The analysis results of the variables of each indicator can be seen in Figure 1 and Figure 2.



**Figure 1.** Analysis Critical Thinking of Each Indicator



**Figure 2.** Analysis Environmental Character of Each Indicator

The next step was testing the research hypothesis began with the normality and

homogeneity test to determine the type of statistics to be used. The result Recapitulation of normality and homogeneity test can be seen in Table 2.

**Table 2.** The result Recapitulation of normality and homogeneity

Test	Varia- nce	Postest Critical Thinking Exper- iment Class	Postest Critical Thinking Control Class	Postest environ- mental character Experiment Class	Postest environ- mental character Control Class
Nor- mality	$X^2$	4,79	3,10	8,87	8,64
	$X^2_{hitung}$	9,49	9,49	9,49	9,49
	$X^2_{tabel}$	Normal	Normal	Normal	Normal
	Crite- ria	distribu- tion	distribu- tion	distribu- tion	distribu- tion
Homo geneity	F test	1,42	Homo- gienity	1,03	Homo- gienity
	F table	2,74		2,74	

Table 2 shows that the data is homogeneous and normally distributed so that hypothesis test was done with parametric statistics i.e. right side of t-test and linear regression test. Recapitulation of t test result can be seen in Table 3.

**Table 3.** Recapitulation of t test result

Result	Postest Critical Thinking		Postest Environmental- character	
	experiment class	control class	experiment class	control class
Average	85,44	81,36	85,9	78
$t_{hitung}$	2,07		2,83	
$t_{table}$	2,03		2,03	
Criteria	critical thinking skill of the experiment class was better than the control class		environmental character value of the experiment class was better than the control class	

Based on Table 3, it is known that critical thinking skill and environmental

character value of the experiment class was better than the control class. This is because the experiment-class was given SSI learning which connects the material to students' daily life. Through SSI learning, students were used to do analyzing so that they could develop their critical thinking skills. It was in accordance with the results of Pinzino's research (2012) that SSI learning could improve conceptual understanding. However, the experiment-class was given a learning with pictorial riddle method in form of comic and SAS. The comics could help students to be motivated and enthusiastic in learning because based on the initial needs analysis, they like stories like comics. Comics could help students to develop their thinking skills which had contribution to student science literacy (Matalovic, 2009). In addition, Aryawan (2014) examined that the pictorial riddle method could improve students' thinking skills.

After the t test, the regression test was performed. The steps taken in simple linear regression test was aimed to determine the regression equation; to test the significance and the linear regression equation; to calculate the correlation coefficient; to determine whether there was a relationship between environmental-care characters and critical thinking; and to calculate the coefficient of determination to find out how much the impact of environmental-care character to the critical thinking skill. The recapitulation results of simple linear regression test can be examined in Table 4.

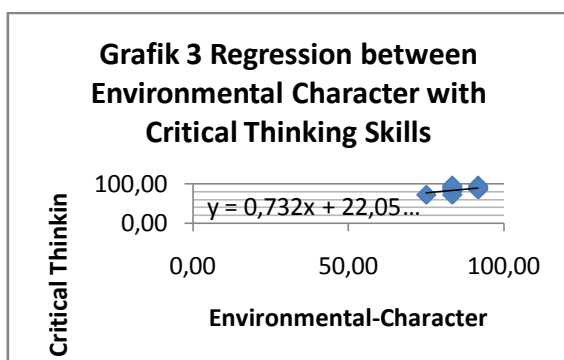
**Table 4.** Recapitulation results of simple linear regression test

Linear regression test	Results
Regression equation	$\hat{Y} = 0,733 X + 22,05$
Test the significance and the linear regression equation	F calculate = 5,64 F table = 4,60 Criteria = significant
The correlation coefficient ( $r_{xy}$ ) dan determination ( $r^2$ )	$r_{xy} = 0,54$ $r^2 = 0,29$
Test the significance correlation coefficient	t calculate = 2,37 t table = 2,14 Criteria = significant

Table 4 shows that based on the simple linear regression test that had been conducted, it was gained a regression equation  $\hat{Y} = 0,733 X + 22,05$ . The equation implied that if the students did not possess an environmental-care character ( $X=0$ ), their critical thinking skills would score 22.05. However, if the environmental-care character scored 1, the critical thinking skills scored 22.783. Based on the result, it was known that students' critical thinking did not only influenced by environmental-care character but also other factors. It was suitable with Elsa et al's research (2014) which states that there is adequate correlation between critical thinking skills and environmental-care attitude.

The next step is the test of meaning and linear regression equation. The test was performed by using the F test and the result showed that the F arithmetic was greater than F table so that the significant criterion was obtained. Based on these results, it was known that the regression equation was linear, means that the environmental-care character has a positive impact on the critical thinking skill. Learning with SSI approach that concerned on environmental issues could improve cognitive abilities in decision making (Zo'bi, 2014).

After the linear test, the next was the test of coefficient and determination correlation to find out how much the correlation value between variables X and Y. Table 4 shows that the correlation coefficient scored  $r_{xy} = 0.54$  and the calculation of the coefficient of determination scored of 0.29. Suparno (2014) stated that the correlation coefficient shows the strong correlation between X and Y variables. The results showed that 29% of students' critical thinking skill was influenced by environmental-care character, while 71% was influenced by other factors. Furthermore, the significance test of correlation coefficient was performed to know whether there is a significant impact between environmental-care character and students' critical thinking skills. Based on t test results, it was found that calculated t was bigger than t in the table, so it was concluded that there was significant impact between environmental-care character and students' critical thinking skills. The significant impact can be seen in the data distribution graph of regression test in Figure 3.



**Figure 3.** Regression between Environmental Character with Critical Thinking Skills

Based on figure 3, it is known that every student has different ability/skill. The oblique position of the graphic shows

that if the students have a good environmental-care character, they will also have good critical thinking skills as well. The good result is because students were given SSI learning that connected the materials of nature science (IPA) and social science (IPS) (daily life). SSI's learning contributes to the improvement of critical thinking skills and character development (Zeidler & Bryan, 2009).

### 3 CONCLUSION

Based on the hypothesis test and data analysis, it is concluded that there is a significant impact between environmental-care character and students' critical thinking skill. The greater the environmental-care character, the greater the students' critical thinking skill will be. Based on the simple regression test, the regression equation gained is  $\hat{Y} = 0,733 X + 22,05$  with correlation coefficient 0,54 and determination coefficient 0,29. It shows that 29% students' critical thinking ability was influenced by environmental cares, while 71% was influenced by other factors.

The result of simple linear regression test showed a good result, yet the measurement of the environmental-care character should be more intensive and have more time so that the result will be more valid. Furthermore, indicator measurement of environmental-care character should be more detail and comprehensive so that the result would be more valid.

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