KnE Social Sciences

IC-HEDS 2019
International Conference on Humanities, Education, and Social Sciences
Volume 2020

Knowledge E
enriching | engaging | empowering

Conference Paper

Collaborative Learning Model With Problem Solving Approach To Improving Student Environment Sensitivity

Aminah Zuhriyah[1], I Made Astra[2], and Yufiarti[3]

[1]Doctorate Program, The Education of Population and Environmental Program, State University of Jakarta, Jakarta, Indonesia
[2]Professor, Lecturer of Physics Program, State University of Jakarta, Jakarta, Indonesia
[3]Professor, Lecturer of Education of Population and Environmental Program, State University of Jakarta, Jakarta, Indonesia

Abstract

In the era of globalization, many environmental problems have emerged, but individuals and communities are treating these issues with necessary seriousness. This study suggests that it is necessary to build a sense of sensitivity to the environment. Environmental Sensitivity is a predictor responsible for the environment, written on the goals and objectives in environmental education and empathy views or understanding of the environment. The purpose of this study is to look at collaborative learning models using problem-solving to increase students' environmental sensitivity. Research is based on quantitative and pretest-posttest experimental design methods used in class X-Accounting Yatindo Vocational High School students in Bekasi. The results showed that students who studied collaborative learning models with problem learning (experimental class) displayed a higher sensitivity than students in the control class undergoing conventional learning.

Keywords: collaborative learning model, problem-solving approach, environmental sensitivity

Corresponding Author:
Aminah Zuhriyah
aminahzuhriyah2808@gmail.com

Published: 11 November 2020

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the IC-HEDS 2019 Conference Committee.

1. Introduction

Environmental sensitivity is a predictor of behaviour that is significantly responsible for the environment [1], which is defined as an empathetic view or understanding of the environment and includes the affective domain involving the attributes of feelings, beliefs, and emotions [2]. Based on the environmental sensitivity attribute, environmental sensitivity has the same meaning as environmental awareness, because the component of environmental awareness includes factual knowledge about the environment and environmental issues, for that awareness is the ability to understand, feel or aware

of events, objects, thoughts, emotions, or sensory patterns [4]. In addition, the notion of environmental sensitivity is written on the statement of the goals and objectives in environmental education [5].

2. Methods and Equipment

Before the learning process, students are given an environmental education test to see students' knowledge about the environment. Furthermore, researchers provide information about environmental sensitivity through natural disaster mitigation research, because disaster affects students' psychology, through a collaborative learning model with problem solving in study groups consisting of 3-5 students [6], which involves the environment as a learning medium, and conventional methods, teacher-centered, using verbal communication media between teacher and students. Student learning situations with design (R) - O1 - X1 - O2 | (R) - O1 - X2 - O2, [7] can be seen in Figure 1, as follows:

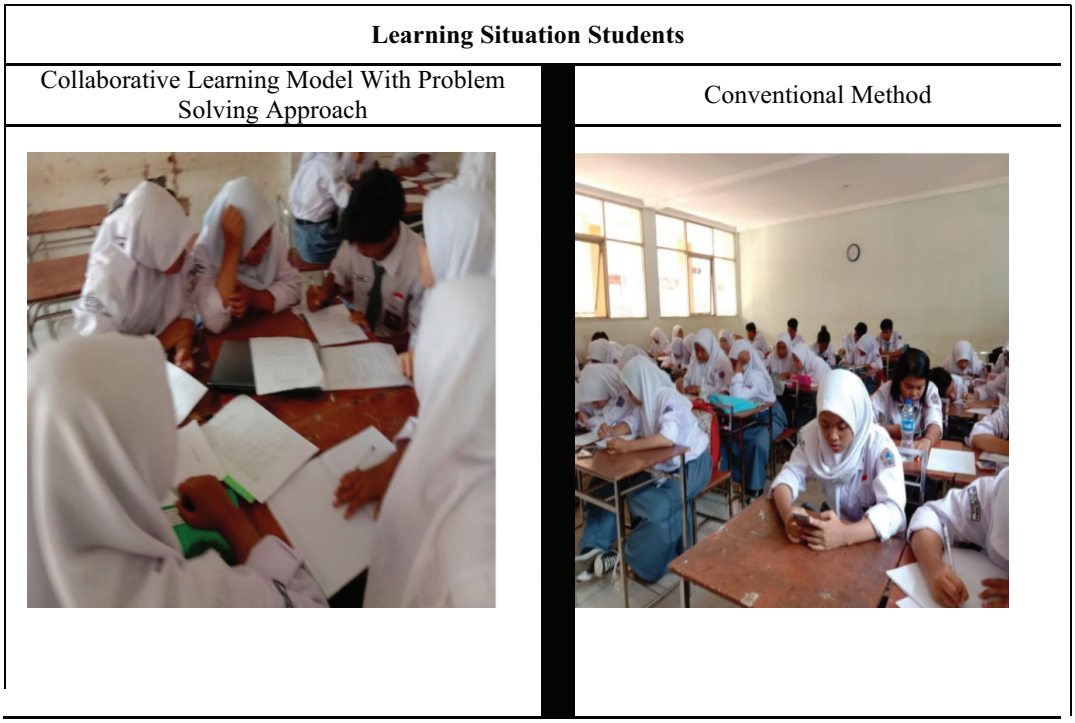

Figure 1: Learning Situation Students in the experimental and control groups

In the collaborative learning model Problem-Solving technique, students are tasked in the process of problem solving in natural disaster management while students who study with conventional methods are assigned to summarize disaster material. After the learning process, the student is given an environmental sensitivity test. To measure

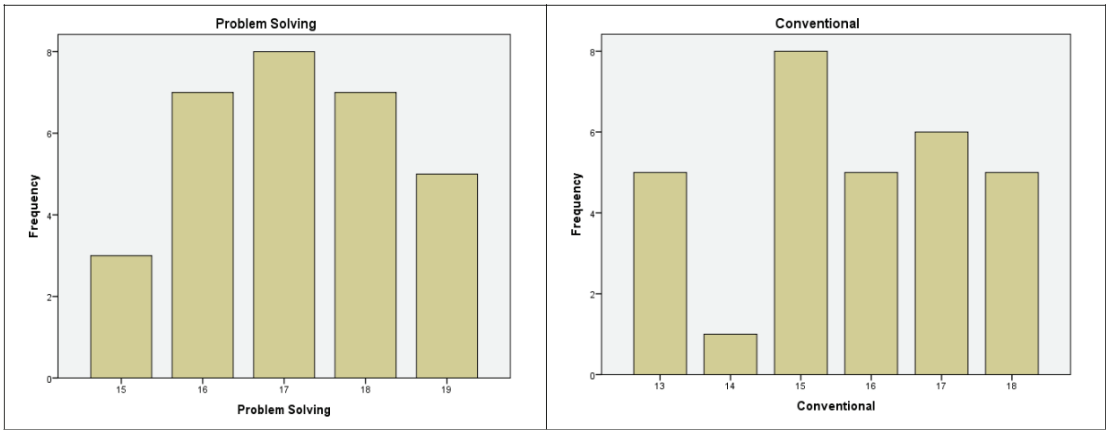

Figure 2: Histograms Results of Environmental Sensitivity Tests of Students Who Learn With Collaborative Models Problem Solving Techniques and Conventional Methods

students' environmental sensitivity by developing an environmental sensitivity instrument based on the EE-adventure canoe. Hungerford and Volk (1990) which document the cognitive and affective domains by including the attributes of feelings, beliefs and emotions [2].

3. Result

The results of this study were obtained from the pretest and posttest data of experiment and control class students, the pretest and posttest data to obtain maximum student assessment, the researchers conducted a normalized Grain test (g) [8], to see students' ability in problem-solving after being given Collaborative learning with problem-solving approaches in experimental group students and to be compared to students' ability to control groups with conventional methods. The normalized Grain test formula (g) used, as follows:

$$g = \frac{score.post - test - score.\ Presest}{score.ideal - score.\ Preset}$$

The normalized gain (g) category is:

- $g < 0{,}3$ = Low
- $0{,}3 \leq g \leq 0{,}7$ = Sedang
- $g > 0{,}7$ = High

To find the normalized Grain test (g), determine and get the average value of the pretest and posttest, can be seen in Table 1, as follows:

Table 1: Pretest and Postest Average Value

Test	Experiment	Control
Pretest	14,90	15,37
Postest	17,13	15.70

3.1. The Normalized Grain test calculations (g) in the Experiment Class

$$g = \frac{17,13 - 14,90}{20,00 - 14,90} = 0,437$$

Table 2: Grain Normalization test results (g) Experimental Class students

total Subject	Average value Posttest	Average value Pretest	Mean Gain	Mean Normalized Gain	Criteria
30	17,13	14,90	93,58	0,437	Sedang

In Table 2. The average normalized gain (g) = 0.437 is obtained with high criteria. The conclusion that environmental problem-solving skills in students who learn to use collaborative learning models with problem-solving approaches are included in the medium criteria.

From Table 1. Also obtained information that groups of students who learn using collaborative learning models with problem-solving are included in both criteria based on the average score percentage of the ideal score (P), $\rightarrow$

$$P = \frac{Postest}{20} \times 100$$

$P = \frac{17,13}{20} \times 100 = 85,65$ the results are good, based on the following criteria:

Table 3: Presentation of Ideal Scores for Experimental Class students

	P	≥80%	Good student skills
60% ≤	P	<80%	Student ability is sufficient
	P	<60%	Students lack ability

3.2. The Normalized Grain test calculation (g) in the Control class

$$g = \frac{15,70 - 15,37}{20,00 - 15,37} = 0,07$$

Table 4: Grain Normalization test results (g) Control Class students

total Subject	Average value Posttest	Average value Pretest	Mean Gain	Mean Normalized Gain	Criteria
30	15,70	15,37	12,69	0,07	Low

In Table 4 the average normalized gain (g) = 0.07 is obtained with low criteria. The conclusion that environmental problem-solving skills in students who learn to use conventional models are included in very low criteria.

From Table 1, information was also obtained that the group of students who studied the conventional model included in the criteria was sufficient based on the percentage of average scores from the ideal score (P). →

$$\frac{postest}{20} \times 100$$

$$15,70$$

$$P = \_\_\_\_\_ \times 100 = 78,5,$$

The results include sufficient criteria, based on the criteria below, as follows:

Table 5: Presentation of Ideal Scores for Control Class students

	P	≥80%	Good student skills
60% ≤	P	<80%	Student ability is sufficient
	P	<60%	Students lack ability

From the normalized Grain test results (g) above, it is concluded that the problem-solving ability of students who learn collaborative learning models with problem-solving approaches is higher than students who learn conventional methods because the collaborative learning model with problem-solving approaches students will learn the problem environment, where students will learn and observe the environment as a learning medium, with a problem-solving framework that is made will be able to feel the situation and the existence of thought [9].

3.3. The Calculation of Environmental Sensitivity Data

Table 6 shows that the mean score of environmental sensitivity scores for the experimental group students was higher than the control class students group. To find out whether or not there are significant differences in the environmental sensitivity of students. Then the data are analyzed through hypothesis testing through the following steps:

Table 6: Description of Statistics Environmental Sensitivity Data

		Experiment	Control
N	Valid	30	30
	Missing	30	30
Mean		17,13	15,70
Median		17,00	16,00
Mode		17	15
Std. Deviation		1,252	1,664
Variance		1,568	2,769
Minimum		15	13
Maximum		19	18

3.3.1. Distribution Data Normality Test

Table 7: Tests of Normality

	Model/Class	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Environmental	experiment	,156	30	,062	,916	30	,021
Sensitivity	Control	,149	30	,086	,906	30	,011

a. Lilliefors Significance Correction

From Table 7, it shows that the Kolmogorov-Smirnov value for the experimental class = 0.062 and the control class = 0.086, meaning that Ho is accepted, in conclusion, both classes are normally distributed.

3.3.2. Homogeneity Test of Two Variants

Table 8: Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
3,092	1	58	,084

From Table 8, it shows that the Levene statistic sig value to determine the homogeneity test results of the two variances = 0.084, meaning that Ho is accepted, the conclusion is there is no difference in variation from each data set or homogeneous. Furthermore, to find out whether or not there are differences in the average sensitivity of students' environments between those learning collaborative learning models and problem-solving approaches with conventional learning.

3.3.3. Hypothesis Testing with T Test.

From the results of the Independent Samples Test in Table 9, the value of t-test = 3,770 is obtained > t table test = 2,039 with value Sig. (2-tailed) = 0,000. < sig table = 0,05 So Ho rejected, the conclusion that there are differences in the sensitivity of students who learn to use collaborative learning models with problem-solving approaches is higher than students who learn conventional methods.

TABLE 9: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Environmental Sensivity	Equal variances assumed	3,092	,084	3,770	58	,000	1,433	,380	,672	2,194
	Equal variances not assumed			3,770	53,868	,000	1,433	,380	,671	2,196

4. Discussion

The success of the collaborative learning model with a problem-solving approach to enhance environmental sensitivity, because this model studies the steps of the problem-solving process is to recognize problems and investigate problems [10]. Both of these steps are used as students' affective and cognitive abilities which are components of environmental sensitivity [3]. In this study, students' environmental sensitivity is built only as a response to the desires or interests of students studying the environment [11]. Environmental events that can attract students' attention to study natural disaster material [12]. Learning to solve environmental problems must be done together with group friends. To study and observe the environment, the researcher must adjust the material being studied (natural disaster mitigation). This material can attract students to feel the situation of events, and proven the desire of students to learn collaborative learning models with problem-solving approaches (specifically environmental problems) can increase students' sense of sensitivity to the environment, this can be evidenced from the results of the normalized Gain test (g).

5. Conclusion

The conclusion of this study is based on the hypothesis test or t-test, the value of t-count = 3,770 and t-table 2.039, and the value (Sig. 2-tailed) = 0.000 < sig table = 0.05, which concludes that there are differences in sensitivity the environment of students who study with collaborative learning models with problem-solving approaches is higher than students who study conventionally in class X-1 and X-2 students of the Indonesian Golden Vocational High School, Bekasi. Because groups of students who study with problem-solving approaches direct students to learn to interact with the environment, where the environment as a source of student knowledge to more actively know the environment. Many know the environment so that students develop a sense of sensitivity towards the environment. While students learn with conventional methods, students are limited to adjusting themselves to their environment.

Funding

This work was self-financed.

Acknowledgement

This research was facilitated by the State University of Jakarta. During this study, the researcher was guided by Prof. Dr I Made Astra, M.Sc as promoter 1 and Prof. Dr Yufiarti, M.Psy as promoter 2.

Conflict of Interest

The authors have no conflict of interest to declare.

References

[1] Sward, L. L. (2006). Significant Life Experiences Affecting the Environmental Sensitivity of El Salvadoran Environmental Professionals. *Environmental Education Research,* vol. 5, pp. 201-206.

[2] Sivek, D. J. (2002). Environmental Sensitivity among Wisconsin High School Students. *Environmental Education Research,* vol. 8, pp. 155 – 169.

[3] Metzger, T. and Mc Ewen, D. (2010). Measurement of Environmental Sensitivity. *The Journal of Environmental Education*, vol. 30, pp. 38-39.

[4] Zareie, B. and Navimipour, N. J. (2016). Environmental Sensitivity in New Zealand Dairy Cattle. *Computers in Human Behavior,* vol. 59, pp. 1-8.

[5] Veselinovska, S. S. and Osogovska, T. L. (2012). Engagement of students in environmental activities in school. *Procedia - Social and Behavioral Sciences,* vol. 46, pp. 5015 – 5020.

[6] Marjan, L. M. D. and Laal, M. (2012). Collaborative Learning: What Is It. *Procedia - Social and Behavioral Sciences.* vol. 31, pp. 491– 495.

[7] Geoffrey, M., DeMatteo, D. and Festinger, D. (2005). *Essentials of Research Design and Methodology.* Canada: John Wiley & Sons.

[8] Meltzer, D. E. (2002). Addendum to: The Relationship between Mathematics Preparation and Conceptual Learning Gain in Physics: A Possible “Hidden Variable” in Diagnostics. *Am. J. Phys,* vol. 70, pp. 1259-1268.

[9] Kapoor, N., Bansal, V. K. and Jain, M. (2020). Development of Creative Problem-Solving Based Framework for Site Planning in Hill Areas. *Frontiers of Architectural Research,* pp. 1-17.

[10] Jones, B. F., Rasmussen, C. M. and Moffitt, M. C. (1997). *Real-Life Problem Solving. British Library Cataloguing-in-Publicatioll Data.* Washington DC: America Psychological Association.

[11] Cheng, T. and Homer C. W. (2015). How Do Environmental Knowledge, Environmental Sensitivity, and Place Attachment affect Environmentally Responsible Behavior? An Integrated Approach for Sustainable Island Tourism. *Journal of Sustainable Tourism,* vol. 23, issue 4, pp. 557-576.

[12] Mao, X., *et al*. (2018). Psychological Impacts of Disaster on Rescue Workers: A Review of the Literature. *International Journal of Disaster Risk Reduction,* vol. 27, pp. 602 – 617.