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Implementation of science learning with local wisdom approach toward environmental literacy

A Ilhami*, R Riandi, and S Sriyati
Departemen Pendidikan IPA, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi No. 229, Bandung 40154, Indonesia

*Aldevailhami2@gmail.com

Abstract. Science learning related to everyday life including society’s traditions believed since ancestor, known as local wisdom. The aim of the study was to determine the effect of implementation science learning with local wisdom approach to enhance student’s environmental literacy. The research design was a matching-only pretest-posttest control group design. The population and sample were 7th-grade students of SMPN in 50 city regency numbering 46 people. Data collection used environmental literacy instruments containing three components that are knowledge, competencies (cognitive skill) and affective. The results showed that data was normal and homogeneous so that based on t-test result showed that there was a significant difference in students' environmental literacy between control and experimental class. The conclusion of the study that implementing science learning with local wisdom approach influenced students' environmental literacy. The implication of this research is teachers should use local wisdom context on relevant science materials to reinforce the concept that students learned.

1. Introduction
One of the science learning outcomes is that student must understand their environment. A science learning is closely related to phenomena surrounding environment. So, it should build environmental character for students. Based on the survey showed that there were low attitudes and concerns of students toward their environment [1]. This is certainly apprehensive for us because it should be higher education level students achieved better care about the environment students do. Then based on science education framework students are expected to be able to apply science competencies learned in schools and utilize an environment as a learning resource.

One way to increase the sensitivity toward the environment is by raising local wisdom values. As we know that Indonesia is one country rich in local wisdom. Local wisdom is the idea of a local community containing the value of wisdom passed on from one generation to the next generation. People adapt their environment to produce knowledge or equipment that has wisdom and it is regulated in customary norms. Local wisdom is considered not merely a mere symbol or characteristic of locality but it has usefulness for the local community. The function of local wisdom can be seen from several aspects, one of which is related to the preservation of natural resources.

Culture is a product of human being as a social society. Social factors can affect a person's cognitive development as found in the theory of constructivism learning. This theory considered that the social environment plays an important role in the formation and development of a person's cognitive [2]. According to Vygotsky theory, that interaction with people around the environment can stimulate development process and encourage student cognitive growth. In line with the results of research was
that cross-cultural learning by utilizing subakcopedadogy in Bali province can provide inspiration and motivation for students [3]. Then according to [4] stated that education not only offers students to understand easily of the subject matter but also offers the values of truth and love for local culture. So it is important to introduce local cultural heritage to students. The integration of cultural content in science learning can create contextual learning. Learning science is more meaningful for students because it is related to their daily life. Appropriate methods for learning based on local wisdom are experimentation and observation [5].

Environmental literacy can be referred to as literate to the environment or action based on environmental awareness. According to [6] that environmental literacy is a basic education for all those who provide knowledge, skills, and motivation to overcome environmental problems and contribute to sustainable development. According to [7] that environmental literacy is a person's ability to understand the environment and play a role in efforts to protect and improve the quality of the environment. Several studies related to environmental literacy such as increased environmental literacy can be achieved by using problem-solving model [8], [9]. Then the results of research [10] indicate there was an increase of students' environmental literacy on the domain knowledge and skills in the medium category through the application of integrated science learning. Environmental literacy is influenced by several factors one through social factors. According to [11] that interaction between humans and the environment can make a person have environmental literacy. Research conducted by [12] on the development of an environmental literacy instrument to measure knowledge, attitudes, behaviors, and demonstrated skills that the correlation of attitudes and knowledge was then found to be gender, parents, and student information sources about the environment can influence environmental literacy.

Based on this background, it can be formulated the research question that is how the influence of application of learning with local wisdom approach to the improvement of environmental literacy? This study limits the local wisdom applied to local wisdom related to environmental conservation. Researchers use local wisdom of Ikanlarangan in the province of West Sumatera.

2. Method
This research used a quasi-experiment method. The research design used was matching-only pretest-posttest control [13].

| Group      | Pre-test | Treatment | Post-test |
|------------|----------|-----------|-----------|
| Control    | O        | C         | O         |
| Experiment | O        | X         | O         |

Note:
X: Science learning integrated local wisdom of Ikanlarangan
C: Science learning did not integrated local wisdom of Ikanlarangan
O: Pre-test and Post-test

The choice of control and experiment class is done randomly. Research subjects were 46 people consisting of 26 people control class and 20 people experimental class in one of junior high school in west Sumatera. The local wisdom selected is the Ikanlarangan, management of aquatic environment based society’s knowledge by Minangkabau tribe, so that the selection of research location by purposive considering the location of the local wisdom. The instrument used was an environmental literacy instrument that has 3 domains consisting knowledge, skills, and attitudes. Environmental literacy data was measured from a gain value, a difference between posttest and pretest score. Then the data is analyzed using SPSS 16.0 software. The analysis procedure was (1) Data should be seen whether the distributed normal and homogeneous or not (2) Hypothesis test is done by using two independent sample difference test because between the control group and the experimental group are two mutually independent samples. Parametric statistical techniques when the data are normally distributed and homogeneous are analysed using the t-test (equal variance assume) and if the data is normally distributed and not homogeneous then it is analysed using a t’-test (equal variance not assume test). Then the non-
parametric technique is done if the data is not normally distributed then analyzed using Mann Whitney test. The test criteria used were to reject $H_0$ if the value of $\text{Sig. (p-value)} < \alpha$ (usually $\alpha = 0.05$) and to receive $H_0$ under other conditions.

### 3. Result and Discussion

The t-test is performed using SPSS 16.0 to determine whether science learning using a local wisdom approach can increase the students' environmental literacy. Based on the result of normality test using Shapiro-Wilk test showed sign $0.415 > 0.05$ and $0.653 > 0.05$. This indicates that $H_0$ was accepted, the control class data and the experimental class are normally distributed. The normality test results can be seen in Table 2.

**Table 2. Environmental Literacy Normality Test**

| Class     | Statistic | df  | Sig. |
|-----------|-----------|-----|------|
| Control   | .961      | 26  | .415 |
| Experiment| .965      | 20  | .653 |

Since the data of the two classes is normally distributed, it is followed by homogeneity test. Based on levene test results showed sign. $0.767 > 0.05$ which meant $H_0$ accepted, the data in the control and experiment were distributed homogeneous. Homogeneity test results can be seen in Table 3.

**Table 3. Environmental Literacy Homogeneity Test**

| Levene Statistic | df1 | df2 | Sig.  |
|------------------|-----|-----|-------|
| .089             | 1   | 44  | .767  |

Normally distributed and homogeneous data hence the hypothesis test used is t-test. The t-test result (sign.2 tailed) showed $0.1 < 0.05$ so that $H_0$ was rejected which meant there was a significant difference in environmental literacy scores between the control and experimental classes. The result of t-test can be seen in Table 3.

**Table 4. Environmental Literacy t- Test**

| Equal variances assumed | t          | .3.450 |
|-------------------------|------------|--------|

Environmental literacy data measured consists of 3 aspects of knowledge, attitude, and skills. The result of pre-test in the control class obtained an average score of environmental literacy of 72% while in the experimental class of 65%. Then in the experimental class using science learning with local wisdom approach and in the control class using traditional science learning. Then the Post-test result showed that the control class obtained the average of environmental literacy score of 73% while the experimental class got the score of 76%. Because Pre-test score between control and experiment class had a significant difference, Influencing of treatment can be seen from gain value. A gain value of the control class was 1% while the experimental class was 11%. So that gain value between control and experimental class has a significant difference. The result of Pre-test, Post-test and gain value can be seen in Figure 1.
Figure 1. Result of pre-test, post-test and gain value of environmental literacy

In the classroom applied science learning with local wisdom approach, teachers used local wisdom *Ikan larangan* to teach the concept of environmental preservation. Students are invited to observe the local wisdom of *Ikan larangan* area and to think exploring the conservation value contained in the local wisdom. Based on the observation of the learning process shows students very enthusiastic about the learning process outside the class. This stimulates students to think of connecting cultures with science learning. As it is known that learning science related to the activity is in the surrounding area including the activities of the surrounding community. Besides, the tradition of local community that still existed since the ancestors until now shows the existence of goodness value contained in it so-called local wisdom. This proves that science learning is closely related to local wisdom [14]. This is in line with the results of research [15] that most science undergraduate students assume science is closely related to local wisdom so that when used a learning resource then it can create a science lesson that is contextual

4. Conclusion
Application of science learning with local wisdom approach can increase students' literacy environment. Teachers can analyse the teaching materials in accordance with the demands of basic competencies and then connect with local wisdom as appropriate with the teaching materials. If the local wisdom applied is a site such as *Ikan larangan* then the teacher can invite students to observe directly and analyse it so that the local culture can strengthen the concept of science obtained by students.

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References
[1] Amini R 2010 Pengembangan Pembelajaran Pendidikan Lingkungan Berbasis Outdoor Untuk calon Guru Sekolah Dasar, Universitas Pendidikan Indonesia.
[2] Komalasari K 2008 Pengaruh Pembelajaran kontekstual dalam pendidikan Kewarganegaraan terhadap Kompetensi Kewarganegaraan siswa SMP, Universitas Pendidikan Indonesia.
[3] Surata S P K 2013 Pembelajaran Lintas Budaya: Penggunaan Subak sebagai Model “Ecopedagogy” *J. Kaji. Bali* 03, September p. 24–25.
[4] Sudiatmika I A R 2013 Pembelajaran Sains Berlandaskan Budaya Lokal Tri Kaya Parisudha in *Seminar Nasional Fisika dan Pendidikan Fisika* September p. 15–28.
[5] Suastra I W 2010 Model Pembelajaran Sains Berbasis Budaya Lokal Untuk Mengembangkan Kompetensi Dasar Sains dan Nilai Kearifan Lokal di SMP J. Pendidik. dan Pengajaran 43, 2 p. 8–16.

[6] Erdogan M Kostova Z and Marcinkowski T 2009 Components of Environmental Literacy in Elementary Science Education Curriculum in Bulgaria and Turkey Eurasia J. Math. Sci. Technol. Educ. 5, 1 p. 15–26.

[7] Roth C E 1992 Environmental Literacy Collumbus: ERIC Clearinghouse for Science, Mathematics, and Enviromental Education.

[8] Febriasari L 2017 Enhance Environmental Literacy through Problem Based Learning Enhance Environmental Literacy through Problem Based Learning J. Phys. Conf. Ser. 895, 012163.

[9] Maryam N 2015 Penerapan Pembelajaran Berbasis Proyek, Pemecahan Masalah dan Penemuan Terhadap Kemampuan Menalar dan Literasi Lingkungan Siswa SMP Pada Konsep Fotosintesi. [Online]. Available: repository.upi.edu.

[10] Suryanti D Sinaga P and Surakusumah D 2018 Improvement of Students ’ Environmental Literacy by Using Integrated Science Teaching Materials Improvement of Students ’ Environmental Literacy by Using Integrated Science Teaching Materials IOP Conf. Ser. Mater. Sci. Eng. 306, 012031.

[11] Hollweg K, Taylor J, Bybee R, Marcinkowski T, McBeth W and Zoido P 2011 Developing a Framework for Assessing Environmental Literacy.

[12] Chu H E et al 2007 International Journal of Science Korean Year 3 Children ’ s Environmental Literacy : A prerequisite for a Korean environmental education curriculum Int. J. Sci. Educ. 29, 6 p. 37–41.

[13] Fraenkel J R Wallen N E and Hyun H H, 2012 How to design and Evaluate Research in education 8th ed. New York: Mc. Graw-Hill.

[14] Prasetyo Z K 2013 Pembelajaran Sains Berbasis Kearifan Lokal in Prosiding : Seminar Nasional Fisika dan Pendidikan Fisika 2, 1 p. 246–256.

[15] Parmin 2015 Potensi Kearifan Lokal dalam Pembelajaran IPA di SMP in Prosiding Seminar Nasional Konservasi dan Pemanfaatan Sumber Daya Alam p. 278–282.