

Primary Schools Eco-Friendly Education in the Frame of Education for Sustainable Development

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ABSTRACT

A research on primary school education in the frame of education for sustainable development, as known as ESD, is important because the awareness of eco-friendly activities and environment empowerment cannot be developed in a short time. Meanwhile, human activities have caused significant environmental degradation. This is an exploratory study involving 240 participants from four primary schools in Semarang by applying stratified simple random sampling. The data were processed using a two-way test ANOVA and Partially Least Square. This study has found that primary school students in Semarang has a good understanding about the pillars of natural, social and ego in sustainable development. But, there are insignificant differences on the student understanding between class levels about eco-friendly issues. When the education level is higher, the students' understanding on eco-friendly education is not better. This research also has revealed that the school accreditation is insignificant to influence the students in understanding the eco-friendly issues. However, the knowledge stages in ESD innovation diffusion are applied. Therefore, the pattern of education which emphasized the students' knowledge on ESD is still relevant in building eco-friendly behavior.

KEYWORDS

education for sustainable development, eco-friendly education, primary school, innovation diffusion

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Introduction

Millennium Ecosystem Assessment (MA) (Reid et al., 2005) mentions that human activities in the last eight thousand years have caused ecosystem damage, then leads to the extinction of species and threatening the life quality. Indonesia is one of 10 Largest CO₂ Emitters in 2015 (Burck, Marten, & Bals, 2015). Therefore, it is required a global awareness in general, and national level in particular, involving various parties, such as government, industry, and education, which aims to reduce negative impacts of human activities, or even

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help to improve the environment quality in a frame of education for sustainable development.

Education for sustainable development, as known as ESD, is important as the awareness of eco-friendly activities and environment empowerment that cannot be developed in a short time through temporary provision of education or training (Nasibulina, 2015). According to Breiting, Mayer, & Morgensen (2005 in Suduc, Bizoi, & Gorghiu, 2014), ESD is an appropriate educational program to educate people from an early age in order to reduce human dependence on natural and social environments. ESD educates people to participate, be active, and have knowledge of nature, equality, and social justice. It is necessary because ESD is able to enhance consciousness and form human behavior (Nasibulina, 2015). According to Nelson Mandela (UNESCO, 2014) "Education is the most powerful weapon you can use to change the world".

Within the framework of environmental awareness, education in Indonesia is still limited in understanding the environmental education or eco-friendly education or environment-based education that is oriented to reduce the negative impacts, and it is not oriented to ESD that gives more understandings about the preserve of natural environment and the empowerment of social environment. Hopefully, the substance of environmental education is able to provide knowledge and skills in the practice of environmentally friendly, and is even attached to each student's attitude and personality, not merely to pursue an academic achievement. This phenomenon does not only apply in Indonesia but also in other countries, as presented by Sterling (2008 p.2) who states that "we are far better be educated to compete and consume, than to care and to be thrifty".

Using formal approach, ESD which is equivalent to environmental education (Nomura, 2009) is conducted through education in classes either separately as independent subjects or integrated into educational curriculum (Konservasi Unnes, 2014), particularly through the study of local content as stipulated by the Ministry of Education and Culture of the Republic of Indonesia (2014). The eco-friendly education with an informal approach is conducted through activities that are not structured such as a nature school.

It is difficult to identify the failure or success of eco-friendly education whether it is an output of formal educational products or informal educational products. However, the output of formal education in the form of a basic understanding of eco-friendly education needs to be measured and evaluated. An empirical measure of success or weakness of eco-friendly education is useful for evaluating coordination, communication, and participation of all parties. Therefore, a study which explores how eco-friendly educational curriculum scheme is developed and implemented should be conducted. In addition, an evaluation that assesses the success or weakness of eco-friendly education also needs to be conducted in order to develop its models to be more integrated and in accordance with the empirical condition that contains various problems and obstacles.

Eco-friendly education

Eco-friendly education in Indonesia was started on non-formal education. This issue was brought up in relation to the interests of the political elite about

a destruction of nature. This concept is growing in line with increasingly complex social dynamics in Indonesia, namely the problem of over population and poverty (Nomura, 2009). Therefore, eco-friendly education then had a special portion informal education that was attached to particular local content subjects (Menteri Pendidikan dan Kebudayaan Republik Indonesia, 2013).

Eco-friendly education puts the knowledge that is able to change beliefs, behaviors, and especially, the attitude of learners. There is an important finding in the study conducted by Frantz and Mayer (2014) that a person's sense of attachment to their natural and social environment is an important factor that affected their responsibility attitude towards environment. It means, when a sense of belonging to environment is high, it would increase empathy and desire of individuals to help (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997 in Frantz & Mayer, 2014), and to protect. Leopold, (1949 in Frantz & Mayer, 2014), exemplifies "We abuse soil because we regard it as a commodity. However, when we think that soil is as part of our community, then we may treat it with love and full of appreciation".

At the educational level of kindergarten and primary school, eco-friendly education in Romania, for example, is taken in the forms of: 1. cultural activities; 2. part of the subjects' substance; 3. games; and 4. the activities which are specifically intended for the protection of nature, in cooperation with parents or other agencies (Suduc et al., 2014). In this country, teachers gain eco-friendly knowledge through training, symposia, informal meetings, exchange of experiences, and self-learning. Moreover, supports from organizations and individuals deliver great impacts on eco-friendly education. Therefore, teachers get proper equipment in the form of books and audio-video for teaching materials corresponding to the curriculum, computer and internet connection, adequate library, and even methodological guidance for the preparation of lesson plans. (Suduc et al., 2014)

Education for sustainable development

In contrast to the general education that is only understood as a means to resolve problems and to get welfare and social status (Sargeant, 1994 in Lavanya & Saraswathi, 2014), education for sustainable development (ESD) aims to improve the capacity and commitment required to build a sustainable society where individual and group decision considered savings and natural ecological processes; therefore, the quality of life is increasing both now and in the future (Lavanya & Saraswathi, 2014). According to Suduc et al. (2014) the content of ESD implementation, education for sustainable development, can be included in the following categories: 1. Health education; 2. Ecology education, 3. Traffic education, 4. Sports Education, 5. Hazard response education, 6. Citizenship education, 7. Democracy education, and others. The categories mentioned show that ESD does not only emphasize to the concern for the natural environment, but also social elements, namely human beings.

As the implementation of the ESD guidelines at the level of kindergarten and primary school, one of them, it can use the approach developed by Lavanya and Saraswathi (2014) where in the education of kindergarten, students learn to show affection and concern for the environment by singing, dancing, playing, and viewing videos. At the primary level, students are encouraged to have critical thinking and development of responsible behavior by applying student-

centered active learning. As for junior high school level, students are encouraged to be an intrinsic part of school ethics by creating awareness of resources scarcity, and how to use it wisely.

This study used the theory of innovation diffusion (Rogers, 1983) that put communication as an important medium to create an understanding; in this case, it is for students, on knowledge of education for sustainable development (ESD). ESD is a form of educational innovation through the approach of authority innovation-decisions where schools are required to put the content of ESD in the curriculum. The speed of students in adopting innovations is various, where it is influenced by the time length of innovation diffusion, the social system in which the innovation is applied, and the basic capabilities of innovation receiver. The cognition is one of the indicators for assessing the success of ESD as a result of the diffusion of innovation.

Cognition is the ability of individuals to connect, assess, and consider an event. Cognitive development has an important role in children's success in learning because most its activities are always associated with thinking problems. By using knowledge, a person will remember and recognize things or events that ever happened. The process is something complex involving a mental process as cognition reflects the thinking and cannot be observed directly but through displayed behavior that is observable (Bloom's Taxonomy in Forehand, 2005).

In order to know the students' knowledge on the concept of sustainable development, there are a number of questions which will form three types of cognitions, namely awareness-knowledge, how-to-knowledge and principle-knowledge (Rogers, 1983). Awareness-knowledge is a general knowledge about the existence of innovation; in this case, it is about the concept of sustainable development which students gain from learning activities of the concern of ego and environment and also from an extracurricular program. This knowledge has information in general which can be understood by most people. At this stage, the individual will be motivated to learn more than what they get.

How-to-knowledge is knowledge of how people use the innovation appropriately. Rogers (1983) mentions that this kind of knowledge is very important in the decision process of innovation. To enhance the further possibilities in innovation adoption, an individual shall have adequate knowledge-to-innovation. The principles-knowledge is knowledge of the principles of functioning on knowledge gained during learning. All the information has been received and stored in long term memory and has been associated well; therefore, at this stage, they are able to answer the subject matter that has been given systematically (Rogers, 1983).

Methodology

This is an exploratory study in which a study is required to be conducted considering that relevant research about how eco-friendly education applied in Indonesia is still limited (Collis, J., & Hussey, 2009). Some papers were still limited as an individual's opinion, instead of the results of a research.

A survey was used to assess students' mastery on eco-friendly education material. The city of Semarang in Central Java was chosen as the location of this study to consider that it is the capital of the Central Java Province which is

regarded as having higher quality in infrastructure and social strata than other regions in Central Java. This showed that Semarang was considered to have better education quality than other cities and districts in Central Java; moreover, it could be able to be a representation of the other big cities in Indonesia.

The population for the survey was the students of four primary schools from grade 1 to grade 6. Two Public Primary schools and two Private Primary schools were chosen. The selection of public and private schools was necessary because public and private schools were possible to have different policies related to eco-friendly education for their students, especially since the government had allowed using the curriculum 2013 in schools that met certain criteria. A number of 240 samples consisting of various grade levels and schools were chosen proportionally. The survey respondents who were primary school students from various grade levels were selected by using stratified random sampling.

To determine the level of students' knowledge on sustainable development, the researchers gave a test containing 30 items of questions distributed into three sections containing the individual's ability in terms of awareness-knowledge, how-to-knowledge, and principle-knowledge. The researchers put elements of engagement with the environment as one of the success indicators of eco-friendly education in the questionnaire (Frantz & Mayer, 2014). The first part contained basic knowledge consisting of 15 multiple choice questions which contained five questions about ecological/natural sustainability, five questions about social sustainability and five questions about ego-sustainability. The second part consisted of 10 short description questions consisting of three questions about ecological/natural sustainability, four questions about social sustainability and three questions about ego-sustainability. The third part was questions in the form of description which was aimed to determine the individual's ability in evaluating the given subject. This part consisted of two questions about the nature pillar of sustainability, a question about social sustainability and two questions about ego pillars of sustainability. The answers of each respondent were assessed using blind review by a team of teachers from different schools. The students' comprehension of image description and students' opinions about the image were rated with a score of 0 to 5 by the evaluating team. The scores were then compared statistically according to educational level and school accreditation.

The analyses in this study were conducted by using both two-way analysis of variances or two-way ANOVA and Partially Least Square (PLS). By using ANOVA, it could be found out whether each grade level of education had a different understanding of the eco-friendly education and whether it was getting better at each grade level, or vice versa. The PLS was used to test the knowledge stages of Rogers' (Sahin, 2006) that was the relationship between awareness-to-knowledge, how-to-knowledge, and principle-knowledge.

Findings

The education on environmentally concern in Semarang has been conducted since 2001. Each school has autonomy to develop the potential and the need of their capacity in environmentally friendly education. Education for sustainable development (ESD) is aimed to improve the capacity and

commitment required to build a sustainable society. The contents of ESD implementation, at the level of primary schools in Semarang, were included in the following local curriculum: 1. Health education; 2. Ecology education, 3. Traffic education, 4. Sports Education, 5. Hazard response education, 6. Citizenship education, 7. Democracy education, and others. The categories imply that the ESD does not only emphasize the concern for the natural environment, but also for the social elements, namely human beings. Within the framework of ESD, the two pillars led to benefit for individual, which is ego pillar.

Average values and ANOVA between classes

Below is the average value of the student knowledge on sustainability pillars and the knowledge level. The sustainability pillars consist of natural, social, and ego dimension and the knowledge level consists of the stage of awareness-to-knowledge, how-to-knowledge, and principle-to-knowledge.

Table 1. The Knowledge of Sustainable Development

Dimension	Average value *
Nature	7,02
Social	7,17
Ego	6,83
Awareness-to-Knowledge	7,89
How-to-Knowledge	6,86
Principle-knowledge	6,58

*Scale 0 to 10

Referring to the Table 1, this study finds that the average values of the three dimensions of students' knowledge on the natural, social, and ego, are in the high category. The average of each pillar (on a scale of 0 to 10), the nature pillar is 7.02, the social pillar is 7.17, and the ego-pillar is 6.83. This shows that the learning of eco-friendly education conducted in schools helps students understand ecological sustainability. In addition, each individual has tried to satisfy their basic needs as human beings to socialize well in the social environment. The students also realize and understand that the activities oriented to the natural and social pillars will bring benefits for themselves.

The study also finds that awareness-to-knowledge in the population studied is high, of 7.89 (on a scale of 0 to 10). This means that the students' knowledge on eco-friendly aspect is high. However, the process of diffusion of innovation in the population has a declining trend in any process. The average value of how-to-knowledge is only 6.86, it is lower than awareness-to-knowledge, and the value of principle-knowledge is lower, only 6.58. This is an indication of the existence of knowledge stages in education for sustainable development.

Awareness-to-knowledge is the initial stage in which students tried to remember and understand the ESD learning materials. How-to-knowledge is the stage where students began to apply and to analyze a subject. The principle-knowledge was the stage which showed how students started assessing and evaluating the ideas of learning. In this stage, it was assessed how each step

affected the other stages. Theoretically, principle-knowledge was influenced by the previous stages, namely awareness-to-knowledge and how-to-knowledge.

Using Analysis of Variance (ANOVA), the study has found that there is no difference understanding in the students' knowledge on the pillars of natural, social, and ego either in the class level nor school accreditation level. This is indicated by the values of Levene statistic sig. class level factors which are not met the ANOVA threshold value. The Levene statistic sig. of school accreditation has met the ANOVA qualification, except for social pillar, however, the results of F sig. show that there is no significant difference between the class variance.

The study also has found that there was no difference at the knowledge stages in the different class levels and school accreditation. This is indicated by Levene statistic value sig. class level factors that are not met the acceptance criteria. The Levene statistic sig. school accreditation has qualified to use ANOVA, however, the results of F sig. show that there is no significant difference between class variance.

Table 2. ANOVA

Factor	Variable	Levene statistic Sig.	Remark	F Sig.	Remark
Class Level	Nature	,006	not qualified	-	-
	Social	,000	not qualified	-	-
	Ego	,000	not qualified	-	-
	Awareness-to-knowledge	,000	not qualified	-	-
	How-to-knowledge	,021	not qualified	-	-
	Principle-to-knowledge	,000	not qualified	-	-
School Accreditation	Nature	,108	qualified	,534	no difference
	Social	,005	not qualified	-	-
	Ego	,680	qualified	,559	no difference
	Awareness-to-knowledge	,410	qualified	,477	no difference
	How-to-knowledge	,020	qualified	,583	no difference
	Principle-to-knowledge	,260	qualified	,580	no difference

Levene statistic Sig. > .05 qualified

F Sig. > .05 Ho rejected

The knowledge stages

Although there were no ESD knowledge differences in the class levels and inter-school level accreditation, but this study finds that awareness-to-knowledge significantly affects how-to-knowledge which in turn also significantly affects the principle-knowledge as shown in Figure 1. Referring to Table 3, the model of this research has met convergent validity. The factor loadings for each latent variable are above 0.5. These mean that the indicators are able to explain each respective latent variable and that each latent variable is unidimensional. The discriminant validity (all the AVE values are above 0.5) as well as reliability (the composite reliability of all variables are above 0.7), are also met minimum criteria (Bagozzi & Yi, 1988).

Table 3. Validity and reliability of the knowledge stages

Latent Variable	AVE	Composite Reliability
Awareness-to-knowledge	0,59	0,81
How-to-knowledge	0,50	0,75
Principle-to-knowledge	0,61	0,82

The findings of the study show that there is significant between awareness-knowledge and how-to-knowledge at 0.423, and how-to-knowledge and principle-knowledge at 0.343. This means that the higher students understand and remember the ESD learning materials, the easier they are to apply and analyze the material. Similarly, the student is able to analyze ESD material, the more they are able to evaluate the ideas contained in the ESD; although, the effect is not as high as in the previous stage. The variable of awareness-to-knowledge is able to explain the variation in how-to-knowledge as much as 17.9%, while the how-to-knowledge is able to explain variation in principle-to-knowledge as much as 11.7%.

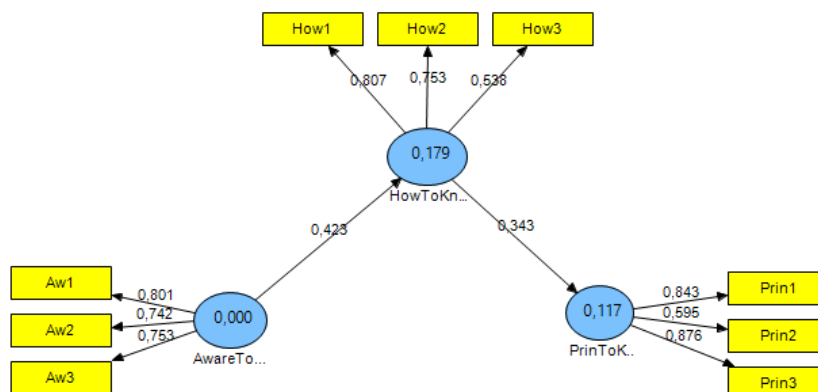


Figure1. The Model of Cognitive Understanding

Conclusion

This research concludes that the eco-friendly education in Indonesia merely emphasized the aspects of cognitive learning, in which knowledge of eco-friendly education was only attached to the thematic materials or local content subjects. The role of ESD only relied on school performance and it did not involve other parties. However, primary school students in the Semarang City had a better understanding in the pillars learning of natural, social and ego of sustainable development. In addition, the students' understanding of ego and social pillars affected students' understanding in the natural pillar. Similarly, the average student's ability to understand, analyze, and evaluate the eco-friendly issues was also good.

This study has proved that the ability of students to know and remember the eco-friendly substance (awareness-knowledge) affected students' ability in applying and analyzing (how-to-knowledge), which in turn also affected students' ability in doing the synthesis and evaluation of eco-friendly programs (principle-knowledge). But, there were insignificant differences between the class levels at the primary school on their understanding of the eco-friendly issues. In addition, the differences in the school's accreditation did not have a significant effect on students in the eco-friendly knowledge. The success of education for sustainable development requires a commitment from the government, schools, families, and communities, which each of them has different participation elements.

Therefore, as the Guidelines for Development of Local Content as part of Permendikbud no. 81a, 2013, education for sustainable development was attached to local content. Meanwhile, local content was a competence that was adapted from the characteristics and potential of the region, and it could not be attached to specific subjects. Meanwhile, the environment and its impact were global issues. Therefore, these issues should have not only handled by local authorities. Supposedly, there are national rules that require ESD substance attachment by using a technical implementation that is stipulated in the local regulations.

Secondly, for further researches, it is necessary to define "investment" between sectors that could encourage them to rely on environmental sustainability. It is useful to increase the commitment of the various parties on education for sustainable development. In addition, it is necessary to conduct a study that measures and compares the ability of cognitive, affective, and psychomotor of students.

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No potential conflict of interest was reported by the author.

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