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PROJECT-BASED LEARNING DESIGN FOR INTERNALIZATION OF ENVIRONMENTAL LITERACY WITH ISLAMIC VALUE

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ABSTRACT

This research aims to produce teaching and learning design to develop environmental literacy among students through project-based learning to internalize the Islamic values. The program was developed through research and development design with three phases: a preliminary study, development program, and feasibility studies. This research produces three characteristics of the teaching and learning programs i.e.: (a) Developing environmental literacy of students based on Islamic values by using project-based teaching and learning; b) Developing the main themes of 'Green Living' of which is divided into four sub-themes: 'Save our water,' 'Save our Soil,' 'Use Eco-friendly Products' and 'Waste for Life'; c) Facilitating students to conduct learning activities, in order to develop scientific skills and environmental literacy. The design model was validated by experts' judgment. The tests showed that this design is feasible to be used in courses. It is suggested that the theme be broadened to include other relevant themes with environmental issues. The study is recommended to be followed up with testing and implementation by integrating the themes in other relevant subjects.

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Keywords: environmental literacy; internalization of islamic values; project-based learning

INTRODUCTION

The environment provides natural resources to sustain our life. God creates this nature which consists of human and the environment in a balance and harmony (Harahap, 2015). This natural resource needs human wisdom to manage it. There are more than 750 verses in the Quran that are related to nature. It is said that nature is indeed a bounty of God (Allah) that makes the humanity and all other living organisms survive in the earth (Ashtankar, 2016). Protecting the environment from all kinds of detriments and preserving the nature is the philosophy of Islamic en-

vironmentalism. This is humans duty to take care of environmental sustainability (Islam, 2004). Humans are obliged to manage and protect the balance of the ecosystem in order to prevent it from degradation and destruction (Primyastanto et al., 2010). Humans' obligation to conserve the environment is related to their role and obligation as the vice regent (khalifah) in this earth (Ashtankar, 2016).

However, in reality, the environment globally continues to change and deteriorate. The increasing number of the human population leads to the increasing need of food, clothes, and land (Forsyth, 2011). This increasing need has resulted in the reduction of a forest as a place to absorb water. Various flora and fauna extinguish (Hunter, 2007). The use of fossil fuel for diverse needs

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has affected broad environmental impacts such as air pollution, acid rain and the increasing concentration of greenhouse gases which resulted in the global warming phenomena (Anthes et al., 2006).

The environmental problem arises because of too much use of this natural resource (Gayford, 2002). Human activities are regarded to be the most dominant factor in causing environmental degradation (Nahdi & Ghufro, 2006). Due to human beings' selfish attitude towards the environment, the balance, coordination and harmony of the universe have all been negatively affected.

The awareness to manage environment should be cultivated among each. Each has to protect, conserve the environment and to anticipate the impact of environmental destruction (Hamdi, 2015). For this, environmental literacy is needed to create the environmentally sound society which is aware of the meaning of ecology and environment for the sustainable life of human beings (McBride et al., 2013).

Environmental literacy is one of the actualizations of the internalization of Islamic values within Muslim personal. The society who has environmental literacy is characterized by their concern for the environment (Clair, 2003). The concern can be seen from the way of thinking, behaving, and acting to the environment (Goldman et al., 2006). This character is greatly related to the values of human behavior which is related to God (Allah), one's self, among human beings, environment and the nation (Desfandi, 2015).

The internalization of environmental literacy as part of the internalization of Islamic values becomes the key to the sustainability of environmental conservation. Therefore, environmental literacy is very important to be developed among students. The student teachers are very potential to create good environment because they will be the agent of change in the society. Student teachers have to pass on good values and characters in order their students are able to conserve the sustainability of the environment.

Based on the initial study in Math and Natural Science Department, Faculty of Education and Teaching UIN Sunan Gunung Djati Bandung, the subject that relates to the effort of developing students' environmental literacy is of Environmental Knowledge subject. The implementation of the teaching and learning method of this subject tends to be dominated by lecture, discussion, and recitation. Students are not yet facilitated to do the actual action to explore their ability. Especially, there is no evaluation yet to measure students' skills and attitudes in environ-

mental literacy because the existing evaluation still uses written examination that measures cognitive ability.

Based on the interview with the lecturer, the four problems regarding the development of students' environmental literacy areas follows. First, the need to deepen the material of this subject is not balanced with the available time. Second, there is a difficulty in developing the standard of teaching model which is suitable with the existing need. Third, there is a need to develop an appropriate strategy in order that the teaching objective is not limited to cognitive aspect but includes skill and behavior. Fourth, there is a contrast between the knowledge that students have and their daily attitudes and behavior toward the environment. The change of the curriculum which currently refers to Indonesian National Qualification Frames/KKNI (Kerangka Kualifikasi Nasional Indonesia) also requires change in the learning outcome of subject matter. The changes are also associated with the contents of the subject, the number of credit semester, the standard of content and process stated in the curriculum. So a new pattern of lectures is needed.

The content of environmental knowledge is integrated with the development of environmental literacy containing Islamic values in the relevant lectures according to the availability of time and the existing needs in the field. Internalization of environmental literacy with Islamic values requires appropriate approaches and strategies, so that the student learning experience is useful for developing high-level thinking skills, creativity, attitudes and values (Tuncer et al., 2009).

Regarding this, we need an appropriate approach and strategy by adopting project-based learning (PBL) as stated by Thomas (2000). Learning Steps on PBL are focused on questions or problems that drive students to encounter the central concepts and principles of a discipline. The projects involve students in a constructive investigation. An investigation is a goal-directed process that involves inquiry, problem solving, knowledge building, critical and creative thinking (Barak & Dori, 2005). In the learning process, students are engaged as active participants, setting their own learning goals and forging meaningful relations through their experiences, as they investigate real-world issues (Krajcik & Blumenfeld, 2006). Based on the ideas, this study aims to develop a learning design for the internalization of environmental literacy with Islamic values using project-based learning strategies.

METHODS

This research uses Research and Development Design adapted from Gall, Borg, & Gall, (2003). The results of design development consist of (1) initial study to analyze the need and the relevant materials to develop environmental literacy and (2) based on the initial study, research is conducted to develop project activity design for teaching and learning. In this phase, it is designed: (a) the description of the project-based activities to develop environmental literacy for the student teachers; (b) project-based work sheet for the selected topics; (c) assessment tools to measure the ability of the students' environmental literacy. After that, the design and the instruments are properly tested.

The proper test is undertaken by validating the content conducted by three expert validators. The content validation is undertaken to the teaching and learning design, worksheet, assessment rubric and environmental literacy questionnaire. For this validation, the validators are asked to give feedbacks and comments for revision by filling up the validation sheet. The given answers for validation use the following scale: relevant=3; lack of relevant=2; and not relevant=1. If their answers lack relevance and irrelevance, the validators are asked to give comments for revision.

RESULTS AND DISCUSSION

The focus of the content to develop environmental literacy with Islamic Values is packed by combining the basic content of Science and everyday environmental issues in one theme of

the project-based learning. The development of this theme should consider its easiness to be applied, its interestingness and usefulness to be stimulated in the teaching and learning.

The packaging in the teaching and learning adopts the project-based learning which aims for the students to develop various basic skills (scientific works skill), thinking skill, the skill to make a decision, the creative abilities and the abilities to solve the problem (Thomas, 2000). By using this approach, the students could produce the product of thinking and the realization of activities which contribute to the improvement of the environment.

The theme 'Green Living' is developed to give knowledge, to foster awareness and to build behavior and values in order the students can conserve the sustainability and the balance of the environment. The essence of 'Green Living' is related to the effort to hold the rate of change in the global climate or the global warming (Rinkesh, 2009). After the teaching and learning process, the student teachers are expected to change their attitudes and behaviour, especially because the life style of 'Green Living' is following the life style of the Prophet Muhammad ('peace and blessing be upon him'). The statement was reinforced by Manoiu et al. (2016) that the Prophet Muhammad ('peace and blessing be upon him') could be considered a pioneer of environmentalism, preservation, sustainable development and resource management. The result of the analysis of the main theme 'Green Living' to develop environmental literacy for each sub-theme can be seen in Table 1.

Table 1. The Development of Environmental Literacy in The Theme 'Green Living'

No	Sub Theme	Aims	Main Activities	Environmental Literacy
1	'Save our Water'	To analyze the relation between the water cycle in the earth and the act of saving water To design the trial on how to use detergent wisely To design the project of simple water purification	Analysis of the relation between the water cycle in the earth and the act of saving water The use of detergent wisely Simple water purification (lab scale)	Knowledge about water cycle, attitudes in using water, behavior in using water and skill to do trial in using detergent wisely and skill to purify water (lab scale)
2	'Save our Soil'	To design the trial on how to conserve soil To design the project on how to improve absorption capacity of soil against water	Trial of conserving soil Making bio-pore	Knowledge about the importance of soil conservation, attitudes towards soil conservation and skill in doing trial of conserving soil and making bio-pore

No	Sub Theme	Aims	Main Activities	Environmental Literacy
3	'Use eco-friendly product'	To identify eco-friendly product To design eco-friendly product for the media of teaching and learning Natural Science	The choice of eco-friendly product Making teaching and learning media from eco-friendly product	Knowledge about the importance of using eco-friendly product, attitudes in applying the use of eco-friendly product, the skill to make teaching and learning media from eco-friendly product
4	'Waste of life'	To design waste treatment to make compost To design pilot project to make biogas	Making compost Making biogas (lab scale)	Knowledge about waste for life, attitudes in waste treatment, skill to treat waste

The students are firstly provided an explanation about the issue of global warming. This preliminary stage is intended to raise awareness of students about the importance of all the learning activities in each sub-theme. Students activities in the introductory teaching and learning are as follows: (1) observing and writing the important issues related to global warming through video; (2) Discussing about 'Why global warming is happening? What are the impacts of global warming? What can be done to deal with global warming?'; (3) Assisted by discussion process, the students are asked to read about global warming; (4) The result of the discussion is written in a report and is presented.

In the sub-theme of 'Save our Water,' the students are asked to analyze the relation between water cycle and the act of saving water. Through this activity, it is expected to raise their awareness to save water. The students are also asked to analyze the need for water used in daily life as part of self-reflection.

Saving water is an act modeled by the Prophet Muhammad ('Peace and blessing be upon him'). One of the most striking Hadith (The prophetic tradition as it is narrated by the most authoritative sources) relates to the rejection of the excessive use of commodities, some of which may be directly taken from an over-abundant nature (Islam, 2004). In Islam, it is required that before prayer, the faithful must ablution (wash a part of body i.e. mouth, nostrils, face, arms, head, and feet). The Prophet urged moderation and thriftiness in the use of water during ablution. He had ablution with only one mud of water (one mud is equivalent with one cistern of both adult hands). He warned that each step of ablution should not be performed more than three times even if water supplies were abundant. He warned: "Whoever

increases (more than three) he does injustice and wrong" (Islam, 2004). According to some Islamic scholars, this type of behavior has been discouraged, because it would lead to the development of a wasteful outlook towards the gifts of nature. In the light of this Hadith excessive use of world non-renewable resources such as fossil fuels, even by those who can well afford it, is totally out of line with Islamic teaching (Kula, 2001).

In the sub-theme 'Save our Soil,' the students analyze the cause of landslide: the deforestation. Then, they simulate how the impact of the soil slope and the number of trees on the occurrence of a landslide. Through this activity, students develop the skill of inquiry, problem solving and critical thinking to the existing problem. Through active teaching and learning, the students are empowered to gain knowledge and new understanding based on their own experience through various exploration (Sumarni et al., 2016). Raising consciousness about soil conservation is essential to encourage the act of planting trees. The Prophet (peace and blessing be upon him) attached great importance to planting trees, protecting existent ones, planting forests, protecting and improving derelict land (Islam, 2004). He advised that the faithful should protect the fertility of agricultural land by taking every possible step to prevent its impoverishment. The faithful must keep planting trees even to the end of the world (Ashtankar, 2016). Breaking the tree trunk and deforesting is prohibited even during the war. Cutting the trees without following the right procedure threatens the sustainable life of earth creatures (Khalid, 2002).

In the sub-theme 'Use Eco-friendly Products', the students' activities are directed to identify eco-friendly products; to differentiate between products and activities which are eco-friendly and

eco-unfriendly. They are asked to look for alternative products and activities other than eco-unfriendly products and activities. It is expected that students have the awareness to use eco-friendly products to support the sustainability and preservation of the environment (Emanuel & Adams, 2011). Besides, it is expected that the students be creative to recycle eco-unfriendly products (such as plastic) to become reusable products.

In the sub-theme 'Waste for life,' the students' activities are directed to process domestic waste which can be easily decomposed by a microorganism to become useful products such as biogas and compost. The experiment work sheet to make biogas and compost is designed for a small scale. This work sheet is developed based on the result of research by Farida et al. (2015). Even though it is a pilot project, it is expected that with this experience to experiment, students can apply this skill when they live in their society.

The two sub themes mentioned above are in accordance with Islamic teachings to maintain cleanliness and preserve the environment (Ashtankar, 2016). Islam has created a bond between faith and cleanliness. The Prophet (peace and blessing be upon him) said: "Faith is some seventy branches, the highest of which is "There is no god but God", and the least is removing obstacles from the path of people, and that shyness is a branch of faith (Ozdemir, 2003). In this context, clearing the path means the removal of material obstacles or solid waste which constitute a kind of pollution. The Prophet (peace and blessings be upon him) warned: 'Turn away from three forbidden acts: defecating in the water source, in the road-side and under the tree shade" In another Hadith, He said: "Truly that Allah is good who loves kindness, clean and loves cleanliness. Therefore, clean up your yards and never imitate the Jewish"(Khalid, 2002). The prohibition of these two Hadiths is intended to prevent environmental pollution. The direct human polluting activity at the time is extended to indirect sources of pollution, such as through sewers. The natural pollutants of the time are extended to include the chemical pollutants (Islam, 2004).

For each sub-theme, work sheet is developed to be used as students' guide in their teaching and learning process. In general, the work sheet being developed refers to project-based learning, which consists of the phase of identifying the problem by giving essential questions, designing project, arranging project schedule and implementing the project (Afriana et al., 2016). The evaluation rubric is developed to measure the

students' performance in their experiment, project report, presentation and their products. The evaluation resulted by using this evaluation rubric is used to measure the students' environmental literacy profile in the skill aspects. By using this evaluation rubric, students' environmental literacy profile can be monitored. This becomes the authentic evaluation based on the students' activities and proofs of their performance in the teaching and learning (Nuryantini et al., 2015).

To measure students' environmental literacy profile in the aspect of knowledge, attitudes, and behavior, a questionnaire is developed whose alternative answers use a scale with four alternative answers. The questionnaire consists of positive and negative statements to measure students' knowledge about environmental balance, attitudes, and behavior toward the environment. The indicators of the environmental literacy refer to the framework of Hollweg et al. (2011). The spread of each aspect being measured in the questionnaire of environmental literacy can be seen in Table 2. The total number of the statement is 78 statements with the choices of the answer are as follows: Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). For positive statement (favorable), the score for SA=4; A=3; D=2; and SD=1. In contrast, for the negative statement (unfavourable), the score for SA= 1; A=2; D =3; and SD = 4.

The Proper test is undertaken by validating the content by three experts validator. Validation is undertaken on the content for teaching and learning design, work sheet, evaluation rubric and environmental literacy questionnaire. The validators are asked to give feedbacks and comments for revision by filling in the validation sheet. The given answers for the validation use the following scales: relevant (R)=3, less relevant (LR)=2 and not relevant (NR)=1 (the result of the validation is presented in Table 3).

Overall, the result of the validation shows that both teaching and learning design and instruments are valid and is feasible to be used because the mean of the validators for all aspects reaches 80 %. However, there are five aspects which are regarded to be less relevant by one validator and therefore, they need to be revised based on the given suggestions. The validators agree that all the themes are relevant to the efforts to internalize Islamic values. In addition, the choice of teaching and learning model is regarded to be able to facilitate students to develop their thinking ability and to improve their environmental literacy.

Tabel 2. Environmental Literacy Aspects Developed in The Questionnaire

Environmental Literacy Aspects	Number of Statements		Total
	Positive	Negative	
Knowledge about environment	27	17	44
Attitudes toward environment	10	6	16
Awareness to act for the environment	9	9	18
Total			78

Tabel 3. The Results of Validation on the Content of Teaching, Learning Design, Instruments (n=3)

No.	Aspects Being Validated	% Response		
		R	LR	NR
A. Teaching and Learning Design				
1	The relevance of the theme with the internalization of Islamic values	100	-	-
2	Interrelation between theme and sub-themes	100	-	-
3	The relevance of each sub-theme with the environmental literacy aspects	100	-	-
4	The relevance of the teaching and learning objectives with the environmental literacy aspects	100	-	-
5	The accuracy of the main activities of teaching and learning being developed with the theme/sub-themes	100	-	-
6	The accuracy of the delivery of the main activities with the development of environmental literacy	100	-	-
7	The accuracy and suitability of teaching and learning steps in the sub-theme of 'Save our Water'	100	-	-
8	The suitability and clarity of teaching and learning steps with the students' activities developed in the sub-theme of 'Save our Water'	67	33	-
9	The accuracy and suitability of teaching and learning steps in the sub-theme of 'Save our Soil'	100	-	-
10	The suitability and clarity of teaching and learning steps with the student's activities developed in the sub-theme of 'Save our Soil'	67	33	-
11	The accuracy and suitability of teaching and learning steps in the sub-theme of 'Use Eco-friendly Product'	100	-	-
12	The suitability and clarity of teaching and learning steps with the students' activities developed in the sub-theme of 'Use Eco-friendly Product'	67	33	-
13	The accuracy and suitability of teaching and learning steps in the sub-theme of 'Waste for Life'	100	-	-
14	The suitability and clarity of teaching and learning steps with the students' activities developed in the sub-theme 'Waste for Life'	100	-	-
B. Work Sheet				
1	The suitability and accuracy of the development of work sheet for each sub-theme	100	-	-
2	The suitability of the content of work sheet with teaching and learning design	100	-	-

No.	Aspects Being Validated	% Response		
		R	LR	NR
3	The accuracy of the content of work sheet to develop environmental literacy	100	-	-
4	The relevance and clarity of the discourse in the work sheet	67	33	-
5	The relevance and clarity of the questions being asked in the work sheet	67	33	-
6	The clarity and the suitability of assignments with the project-based teaching and learning steps.	100	-	-
C. Evaluation Rubric				
1	The suitability of aspects being evaluated with the teaching and learning objectives	100	-	-
2	The suitability of aspects being evaluated with the assignments which have to be done	100	-	-
3	The clarity of the aspects being evaluated with the evaluation scale being developed	100	-	-
4	The completeness of the evaluation criteria with the evaluation scale	100	-	-

CONCLUSION

Project-based teaching and learning program being developed has the characteristics as follows: (1) Developing students' environmental literacy based on Islamic values by using project based teaching and learning steps; (2) The main theme 'Green Living' is divided into four sub-themes: 'Save our Water', 'Save Our Soil', 'Use Eco-Friendly Products' and 'Waste for Life'; (3) The teaching and learning activities facilitate students to develop knowledge, skill and attitudes to build environmental literacy. The result of validation of the teaching and learning design, instrument and evaluation of the environmental literacy is regarded to be proper to be used. Based on the finding and the result of this research, it is suggested that: (1) The themes in the teaching and learning program design to improve the environmental literacy of the student teachers through project-based teaching and learning is being broadened to include other relevant themes with the environmental problems; (2) The program design being developed is better to be continued with testing and implementation widely by integrating the themes in other relevant subjects, especially in the Department of Natural Science.

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