International Journal of Engineering & Technology, 7 (4.33) (2018) 178-181

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper

Evaluation of Vocational School (SMK) Students' Environmental Literacy

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Abstract

This research evaluates the level of environmental literacy of vocational students. The research method used is evaluative descriptive research method. The instrument used is the Environmental Literacy Test. The component of environmental literacy consists of environmental knowledge, attitudes, and "actions" or responsible behavior for the environment. Mastery of the environmental concept of vocational students is based on the achievement of environmental literacy in terms of knowledge and environmental understanding which consists of 8 indicators, i.e.: energy, pollution and contamination, forests, atmosphere / climate, water, waste, and sustainable development. The average mastery of environmental concepts is 51, which included to the low category. The highest knowledge and understanding are population indicators that is an average value of 68 and the lowest value is an atmospheric / climate indicator with an average value of 32. Attitudes and participation in overcoming environmental problems are included in the good category. They have tried to use alternative transportation such as by using bicycle or walking, reducing the use of electricity for lighting and cooling the space, using water as needed, and disposing the garbage in the proper place. Vocational students are still lacking in action as an effort to overcome environmental problems.

Keywords: *Environmental literacy; vocational students.*

1. Introduction

Today's environmental problems are widely discussed since there have been plentiful environmental pollution caused by humans [1]. The further consequences are the symptoms of global warming and climate change related to greenhouse effects, damage to crops, forests and species extinction, reduced fish resources, agricultural land, air pollution and water supplies. Either we realize it or not, all of this happen because human actions do not live in balance with the nature, taking it for granted. Changing human behavior can reduce environmental problems [2]. The approach to planting knowledge about the development of harmony and the balance of the environment is with education and environmental ethics.

Minnesota Office of Environmental Assistance [3] describes environmental literacy as a one's knowledge and understanding of aspects that build the environment, principles that occur in the environment, and is able to preserve environmental qualities applied in everyday life. Therefore, in order to develop citizen's environmental literacy, environmental education must develop an understanding of the ecological system, the causal relationship between human attitudes and behavior towards the environment, and foster environmentally responsible behavior [4].

Environmental literacy is defined as the knowledge of the working mechanism of natural environment and the human role to preserve sustainable environment. Learning about environmental literacy in Vocational Schools (SMK) can be carried out either in an integrated manner with vocational subjects or in separate subjects. As educators, we can have a lifelong impact on students by incorporating environmental education strategies into learning because environmental quality is directly related to students' lives.

Components of environmental literacy consist of: knowledge of ecology (ecological knowledge), cognitive skills (cognitive skills), attitude (attitude), and "action" or behavior responsible for the environment (behavior) [5]. In [6] states that students are able to use their knowledge to determine and take appropriate action in solving environmental problems in society.

Environmental literacy is very important for students. North American Association for Environmental Education / NAAEE [7] explained that humans have a very important role and influence on earth because their number continues to increase. Therefore, the need for food, clean water, fuel and space increase too. Environmental changes will occur every year in both local and global contexts. By this reason, it is necessary to improve environmental literacy. The goal is to prepare humans who can understand and overcome environmental problems. Ultimately, environmental agents that have positive attitudes and actions towards the environment are brought to reform.

According to [8], only those who have literacy, awareness, and sensitivity can contribute to addressing environmental problems. Therefore, instilling environmental literacy to students is very important so that they can become agents of environmental reform which can overcome environmental problems by their action plans. Efforts to integrate the content of environmental literacy into school curricula are carried out differently in several countries. Some countries make environmental education as a separate subject [9]. But some others are integrating environmental education into other subjects such as science, biology, geography, or ecology [5].

In Indonesia environmental education program has been developed based on a joint decision between the Minister of Environment and the Minister of National Education in 2010. The implementation of the program in the curriculum of secondary school education (SMA or SMK) is carried out in two ways: integrated in subjects such as science, biology, physics, chemistry, and geography, or independently as subjects of Environmental Education (PLH) which are generally included in local content subjects. The main objective of environmental education is to make students have environmental literacy.

2. Methodology

The purpose of the study was to evaluate environmental literacy of Vocational High School (SMK) students. The method used is descriptive evaluative research method. Using this method is in line with [10] who stated that descriptive research method is to describe, interpret something, for example conditions or relationships that exist, developments that develop, ongoing processes, effects or effects that occur or about ongoing trends. The instrument used in this study is Environmental Literacy Test. The research subjects were students of SMKN in West Java. This research took place in SMK 1 Sukabumi, SMK 2 Garut and SMKN 5 Bandung City. The results of environmental literacy tests are described using assessment guidelines for Vocational Schools. Furthermore, the average score obtained by students for each environmental literacy indicator is calculated.

3. Results and Discussion

3.1. Mastery of Environmental Concept of Vocational Students

Analysis of PISA in 2006 conducted by the OECD [11] shows that students' awareness of environmental issues is in line with their knowledge and environmental literacy skills. It showed that students who are more familiar with complex environmental phenomena have high skills in literacy environment. Improving environmental literacy skills is intended to prepare people who understand and can solve environmental issues because only people who are environmentally literate can find solutions to these environmental problems [7]. Mastery of the environmental concept of vocational students is based on the achievement of environmental literacy in terms of knowledge and understanding of the environment which consists of 8 indicators, i.e.: energy, pollution and pollution, forests, atmosphere / climate, water, waste, and sustainable development. The results of evaluating the mastery of environmental concepts of vocational students are listed in Table 1.

Table 1: Description of Average Aspects of Knowledge and Understanding Environmental Literacy of Vocational Students

No.	Indicator	Average
1	Energy	48
2	Pollution and Contamination	43
3	Population	68
4	Forest	58
5	Atmosphere/Climate	32
6	Water	52
7	Waste	49
Average		51

Averagely, knowledge and understanding of environmental literacy of vocational students is 51, which is included low. The highest knowledge and understanding are population indicators, with average value of 68 and the lowest value is atmosphere / climate with average value of 32. The low environmental literacy of vocational students requires a serious effort to increase knowledge and understanding of environmental material in vocational schools.
Based on the data in Table 1 it is known that most respondents still had low knowledge and understanding of environmental material. According to [12], if students' knowledge of the environment increases, it is expected that students' positive attitudes toward environment can increase as well, so that future generations can live on livable earth. Therefore, increasing knowledge and understanding of environment is a starting point in an effort to improve positive attitudes towards environment. One effort that can be done is through innovation development of environmental learning programs in vocational schools.
Based on cognitive development mentioned by Piaget, vocational students, which are classified as adolescent, are in formal operational stage. Their reasoning is characterized by sensitivity to others, ability to handle contradictions, and ability to handle combinations of logic and change. Adolescent can reason from general principles to specific actions and are often critical of people whose actions appear to conflict with their principles.

3.2. Attitudes and Participation of Vocational Students in Environmental Management

Attitudes and knowledge of vocational students towards environmental management are listed in Table 2.

Table 2: Attitudes and knowledge of vocational students towards environmental management

Indicator	Percentage (%)				
	Do Not Know at All	Do not Know	Sufficient	Know	Know Well
Knowledge of ecomanagement	11,7	27,2	28,9	28,9	3,3
The implementation of ecomanagement concept	10,6	33,3	34,4	20,6	1,1
Knowledge of persuasion	9,4	18,3	27,3	31,1	13,9
The implementation concept of persuasion	10,0	20,6	31,7	28,9	8,9

Some vocational students know and are able to implement the ecomanagement concept and some have not known it. Environmental management is a framework which can be integrated into the existing business processes to recognize, measure, manage and control environmental impacts effectively. Therefore, the concept of ecomanagement is very important to students. The ecomanagement concept is related to environmental management in a sustainable manner, namely continuous environmental management and thus the impact is long-lasting.
Environmental management is an obligation of every individual to preserve the living place of living things. Efforts can be made to manage the environment in various ways starting from the nearest environment and starting right now. The environmental management that is implemented today will have a long-term impact on us. Therefore, this management must be carried out continuously so our next generation is safe.
Persuasion is communication used to influence and convince others. It is one of the important communication strategies in interacting with others. Some students know and implement the concept of persuasion, but others have not known the concept. Because these two concepts are important, an effort is needed to deepen the two concepts.
Examples of persuasion in environmental management are community empowerment in waste management by making behavioral modification based on the need for clean environmental conditions. It is expected that this can foster and develop community participation in cleanliness. In order to modify the community's behavior, there needs to be an effort to raise their awareness by changing their habits, attitudes and behavior towards cleanliness / garbage. It is no longer based on the obligation, but based on the value of needs, instead. To change these habits, it is necessary to foster community participation that is carried out comprehensively (gov-

ernment, private sector, universities, and ordinary people) and integratively (managers and the whole community).

Environmental problems that arise cannot be solved technical. More importantly, it is a solution that can change the mental and awareness of environmental management. Although it requires a long process, and the results cannot be seen immediately as well as technical solutions, solving solutions through behavior change towards more responsible management of the environment is a very strategic thing to do. This is a challenge for the development of environmental education to be able to contribute to the formation of environmentally responsible behavior.

The description of participation and actions of vocational students to overcome environmental problems are as follows:

a. Most students use alternative transportation such as using a bicycle or walking. This participation is to reduce the impact of environmental pollution of transportation vehicles
b. Some students reduce energy use for room lighting and cooling but there are still some students. Therefore, they need a further explanation of the importance of energy savings.
c. Most students try to reduce the excessive water use but there are still a small number of students who do not do it. This shows that most of them have tried to overcome environmental problems. There are a small number of students who do not have the awareness about the importance of reducing water, so they still need an explanation of water conservation.
d. Most students take and dispose garbage to its place. This provides an illustration that this effort has become a habit carried out by students. This good habit needs to be maintained and improved to overcome environmental problems.
e. Some students have tried to buy products that are easily recycled. This shows that some students try to overcome environmental problems by buying products that are easily recycled and others have not purchased products with recycled packaging.

3.3. Environmental Literacy Learning

Environmental education includes basic knowledge and awareness of environment. Environmental education relates positive attitudes values and actions for the environment. For this reason, learning context needs real emphasis on how students are able to behave and act to improve environmental conditions in society [13].

The general objective of environmental education according to UNESCO [14] in Tbilisi conference is: (1) to help explain the concern about the interrelationship between economy, social, politics and ecology in cities and in rural areas; (2) to provide opportunities for everyone to develop knowledge, values, attitudes, commitments, and abilities needed to protect and improve the environment, and (3) to create new behavior patterns in individuals, groups, and society and overall to the environment. The objectives to be achieved include: (1) knowledge, (2) attitude, (3) care, (4) skills, and (5) participation [15].

The efforts of Indonesian government and society in organizing environmental education are in order that the new generation will be more concerned about the environment. This effort has been pioneered. Environmental education subjects have been included in the curriculum as local content in regular schools. The Indonesian government hopes that by conducting environmental education in schools, students' environmental literacy will develop. However, the facilities are still inadequate such as the lack of teachers with environmental educational background. Generally, environmental education subject teachers are not those with a special background in environmental disciplines. Most environmental education teachers have a biological or geographic education background [16].

The learning process of Environmental Education should be a process of organizing values and clarifying concepts to foster skills and attitudes to understand and respect their human, cultural and physical environment. Knowledge and awareness about the existence and scope of environmental issues is important because it can raise awareness and concern for the environment [17].

A very dynamic relationship between humans and their environment can be seen from how humans live together with all the components around them. What is called the environmental literacy or literacy environment that each individual has to behave well in his daily life by using his understanding of environmental conditions [18]. Environmental literacy is not a new scientific discipline or even a new concept in studying human relations to its environment.

Since its birth, the issue of environmental literacy has attracted the attention of many educational researchers and environmental scientists. Although this term has been widely discussed, there is no generally agreed definition. The initial definition of environmental literacy is proposed by [19] who defines people who are environmentally literate as someone who has basic skills, understanding and feelings about human-environment relations. Then Roth added that environmentally literate people understand the relationship between natural and social systems, human unity with nature, how technology influences decision making on environmental problems and learning about the environment is a lifelong endeavor.

Increasing environmental literacy to students can be done in various ways in the learning process. Several studies related to environmental literacy include research on the development of environmental literacy instruments to measure knowledge, attitudes, behaviors and skills conducted by [20] and show that there is a strong correlation between attitudes and behaviors, whereas between knowledge and behavior is weakest; gender, parents' school background, and student information sources about the environment affect environmental literacy. In [21] in his research revealed that the integration of bioconservation concept in Biology learning to foster literacy and environmental awareness among high school students can be done in Aceh's contextual approach.

Given the condition of mastering the concept of vocational students about environmental literacy, the innovation proposed in environmental learning is constructivism-based learning. Constructivism is a school of philosophy of knowledge that emphasizes that our knowledge is the result of our own construction [22]. Constructivism as a school of philosophy influences many concepts of science, learning theory and learning. Constructivism offers a new paradigm in learning. As a foundation for the learning paradigm, constructivism calls for the active participation of students in the learning process, the need for developing independent learning students, and the need for students to have the ability to develop their own knowledge.

In constructivism-based learning, learning orientation shifts from teacher-centered to student-centered learning. Students are no longer positioned like empty jug ready to be filled or students prepared to be filled with information by their teacher or students are conditioned in such a way as to receive knowledge from their teacher. Students are now positioned as teacher learning partners. The teacher is not the only information center who knows best. Teachers are only one source of learning or information sources. Meanwhile, other learning resources can be peers, libraries, nature, laboratories, television, newspapers and the internet. Some constructivism-oriented learning models are discovery learning, reception learning, assisted learning, active learning, accelerated learning, quantum learning, and contextual teaching and learning, cooperative learning.

4. Conclusion

The results of evaluating the level of environmental literacy of vocational students is as follows:

a. Knowledge and understanding of the environment of Vocational High School students is low on average, that is equal to 51. The highest knowledge and understanding is the population indicator that is of 68 on avaerage and the lowest value is an atmospheric / climate indicator with 32 on average. Therefore, it requires effort to improve knowledge and understanding of environment in Vocational Schools.

b. Some vocational students know and are able to implement the ecomanagement concept and some have not yet known it. The concept of ecomanagement is related to environmentally sustainable management or continuous environmental management. It is expected to have a long term impact on us. Some students know and implement the concept of persuasion, but some others do nott.
c. Environmental participation and action for some vocational students is included as good. They have tried to use alternative transportation such as bicycle or by foot, reducing the use of electricity for lighting and cooling the space, using water properly, and disposing the garbage to its place. However, they are still lacking in action to overcome environmental problems.

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