Students’ Energy Awareness Profile of High, Mid, and Low Levels Junior High School Student in Sragen

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Abstract: Energy awareness needs to be owned by students because environmental and energy problems in the 21st century become more complicated. This research was conducted to describe the profile of students’ energy awareness. The descriptive analysis method was used as the research method. Eighty-four junior high school students in Sragen Regency were selected as the subject. The subjects were selected through purposive sampling technique. The energy awareness instrument was adapted from Climate Literacy and Energy Awareness Network (CLEAN) by National Science Foundation and modified based on energy awareness model from Muhammad G. Hassan which included Environmental Concern, Visibility of Consumption, and Educational aspects. The results showed that the students’ energy awareness on visibility consumption was 52.72% with enough category acquisition while 23.76% on the environmental concern and 21.41% on the education aspects indicate quite low criteria. Based on the results, it can be concluded the students’ energy awareness in Sragen was relatively low, so need to be improved.

Keywords: Energy Awareness, Students’ Energy Awareness, Junior High School

1. Introduction

In the 21st century, environmental problems have become more complicated. The pressures to the environment have been increased with the advancement of science and technology. It caused the degeneration in the quality of the environment and adversely affect human welfare. Population growth has become one of the factors causing the increased demands and needs for the energy, food, fodders, and housings. Moreover, mechanistic expansions of the industry also increasing the demands for energy [1]. In recent time, population growth is not accompanied by the improvements of the awareness and concern toward the environment. The lack of environmentally friendly substitutes augment the adverse effects on the environments [2].

The energy is a crucial problem for sustainable development that needs our attention. Statistics have shown the demands for the energy will be doubled in 2040, particularly in the developing countries [3]. The world today and the world in the future must be "environmentally friendly" to ensure a healthy environment in order to live comfortably so that quality of life can be improved [4]. Those descriptions showed the importance of the energy awareness, the understanding of proper energy usages [5]. Low energy awareness will lead to prodigal lifestyles and uncontrolled natural resources exploitations without concerning the futures.
Based on the aforementioned descriptions, we need concrete solutions to induce the environmental and energy awareness for future generations. Various researches have shown the awareness and concerns toward environmental problems can be taught in the formal educations [6-7]. When students are given environmental education by paying attention to cognitive, affective, and psychomotor aspects, their hopes can permanently instill positive behaviors related to the preservation of the environment and natural resources and the consequences of the use of the environment and natural resources, and they will be actively involved in solving the environmental problems [8-9]. In Indonesia, the environmental problems are one of the topics in various talks and TV programs. But the public awareness to save energy is still low, especially in adolescent age groups to be considered groups that do not care about energy saving efforts, besides feeling irresponsible for energy payments, teenagers think that they do not know the reason why they have to save energy [10]. The government has exerted various efforts to solve those problems. One of them is by issuing the President’s Instruction No. 10 the Year 2005 about the energy conservations, but not fully successful. Thus the Demand Side Management (DSM) have to be improved and need active participation and awareness from the society [11]. The awareness is defined as the yearning to learn, obtain the knowledge, conscious to the problems, and effort to improve problem-solving ability [12].

The study of the individual energy awareness is important because it can answer the lingering questions about the problems, minimize the misinformation, and developing the positive attitude toward the environment. Various researches have shown the individual awareness toward certain subjects continuously enforce their positive attitude from time to time [13-14]. This study also contributed to educational planning to improve students’ awareness toward the environment.

This research was aimed to find out and describe the profile of the energy awareness in the junior high school students. The energy awareness test adapted from the Climate Literacy & Energy Awareness Network (CLEAN) by the National Science Foundation (2018) was used as the instrument [15]. This instrument has been modified based on the Model of Energy Awareness by Hassan et. al [5]. This study was expected to be used as the consideration in decision-making about the energy and environment.

2. Research method
The descriptive qualitative was used as the research method. The steps of the research were preparations, implementation, and analysis. Three Adiwiyata (green) schools were selected to represent the high, mid, and low levels junior high school in Sragen. The Junior high school levels categorized based on the Final Exam Results from Kemendikbud [16]. The instrument to assess students’ cognitive awareness was prepared. The awareness consisted of two domains, cognitive and affective [17]. This research focused on the cognitive awareness. The form of the instrument is a test. The instrument used in measuring students’ energy awareness is adapted from Climate Literacy and Energy Awareness Network (CLEAN) by National Science Foundation (2018) was used as the instrument. The instrument has been modified based on the Model of the Energy Awareness by Hassan [5]. The test consisted of nine multiple-choice questions. In the Implementation Test. The results of the test were calculated to obtain the percentages of each aspect. The results then interpreted to qualify each aspect. The aspects of the Energy Awareness were shown in Table 1.

Table 1: Aspects of Energy Awareness.

| Aspects of Energy Awareness | Quiz Item Number |
|-----------------------------|------------------|
| Environmental Concern (EC) | 6, 7, 8          |
| Visibility of Consumption (VC) | 2, 5, 9     |
| Education (ED)              | 1, 3, 4         |
3. Results

3.1 Energy Awareness Level

The results of the test of the Energy Awareness Levels were shown in Table 2.

Table 2: Results of Students’ Energy Awareness Tests.

| School category | Results of Achieving Energy Awareness Aspects (%) | Mean   | Criteria |
|-----------------|-----------------------------------------------|--------|----------|
|                 | EC                                      | VC     | ED       |
| High            | 30.11                                   | 53.76  | 27.96    | 37.28    | Low     |
| Medium          | 14.49                                   | 52.17  | 17.39    | 28.02    | Low     |
| Low             | 26.67                                   | 52.22  | 18.89    | 32.59    | Low     |
| **Mean**        | 23.76                                   | 52.72  | 21.41    | **32.63** | Low     |
| **Criteria**    | Very Low                                | Enough | Very     | Low      |

Table 2 showed the Energy Awareness Levels of the students from the three schools. It showed that there were no significant differences in the Energy Awareness within those three schools.

The lowest awareness levels of those schools were in the third aspect (ED) (21.41%). When answer the question No. 1, 3, and 4, the students were faced with the knowledge obtained from the schools. Their knowledge was obtained through conscious information finding activities were very low. Based on the interview, it showed the students were not yet understood the concepts of energy sources. They did also not know the energy policy both in domestic and overseas. They also not yet able to predict future conditions of the energy.

On the aspects of the Environmental Concern (Q6, Q7, and Q8), has not so different scores (23.76%) which was very low. This aspect verifies the students’ understanding about the relationship between the energy usages with the environment. Based on the interview, the students were not yet understood the impacts of the energy consuming technology on the environment.

Question (Q) | Environmental Concern
---|---
Q6 | One of the causes of global warming is carbon dioxide emissions. If every household in Indonesia replaces incandescent light bulbs with LED lights, how will carbon dioxide (CO2) emissions in Indonesia change?
Q7 | The fact is that windmills as one of the wind power plants (PLTB) have a negative impact on the existence of birds. Other factors that cause bird deaths are local cars and cats. In your opinion, what causes the most bird deaths?
Q8 | What kind of technology can provide cheap, safe and carbon-free energy for humans?

The highest average score was gained by the aspects of the visibility of consumption (52.72%), medium one. It showed the students have understood about the energy usages in daily life.

The levels of the energy awareness based on the level of the school can be seen in Figure 1.
Based on Figure 1, the highest students’ awareness was obtained in high-level school. The high-level school was leading in every aspect of energy awareness. The scores from those schools did not differ significantly.

4. Discussions

4.1 Energy awareness test.
The energy awareness test adopted from the CLEAN by National Science Foundation (2018) and modified based on the model of energy awareness by Hassan M., et al. [5] was valid and reliable. It has been validated and reviewed by a scientist [5, 15].

4.2 Students’ Energy Awareness Profile of High, Mid, and Low Levels Junior High School Student in Sragen
The results showed the students’ energy awareness was still at the low level. This situation was connected to the minimum exposure about the energy, its sources, its importance, and effect to the environment in students’ textbooks, especially Grade Seventh’s. Therefore, the effectiveness of the curriculum to improve the energy awareness was not yet optimal. This proves that environmental education has not been successfully implemented. Various researches have shown the awareness toward the environmental problems can be gained through environmental education [17, 7]. Environmental educations that consider the cognitive, affective, and psychomotor aspects can embed and improve positive and permanent attitude toward the environment and natural resource conservation, and motivate them to be involved in problem-solving [8-9].

We also obtained an interesting fact, the high-level school was dominating and has higher scores compared with mid-level and low-level school. It showed the connection between the students’ cognitive ability and their energy awareness. This connection has been founded by various researchers [18], and it showed the knowledge about the environment affects the environmental awareness. It was predicted if the students gain high cognitive scores, they will have the high level of environmental awareness [18].

4.3 Implications.
Based on this research, the students from the high-level school have better and higher energy awareness compared to the mid and low-level schools. But the average score from those schools still at low levels. Need for continuous and sustainable efforts to improve students’ energy awareness.

When the students exposed to the environmental educations that consider the cognitive, affective, and psychomotor aspects, they can gain positive and permanent attitude toward environmental conservation [8-9]. Improvement of students’ cognitive, affective, and psychomotor aspects can be done in the schools, to provide understanding, awareness, and advice to the students to have the environmentally friendly behavior and attitude. We hope the improvement of the cognitive, affective,
and psychomotor learning can be done in all kinds of schools, not only in the Adiwiyata (green/environmentally friendly) schools, but also all school in general. To achieve those improvements, need for proper learning model for effective teaching and learning. Continuous evaluations were needed to track how much and how far the improvements in students’ environmental awareness have been achieved.

5. Conclusions
The results showed the students’ energy awareness is relatively low. In future researches, efforts are needed to improve students’ energy awareness with the right learning model. Improved awareness and concern for the energy and the environment can be achieved through learning not only pay attention to students’ cognitive but also their affective and psychomotor.

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