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Introducing the concept of energy conservation for elementary students through the Eduwisata program

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Abstract: Knowledge of energy conservation for elementary students is one of the education efforts to familiarize them with utilizing energy wisely at an early age. Therefore, this community service program is aimed to give knowledge to Elementary students on the use of energy through the Eduwisata program of Taman Rekreasi Sengkaling Universitas Muhammadiyah Malang (UMM). In conducting the community service program, the team observed the activities of the Eduwisata program to know the problems faced by the team of the program. The result of observation is used to plan the material and module as the solutions to the problems. The interview is also conducted with the manager of Taman Rekreasi Sengkaling UMM to find out the potential problems. The result of this community service program is the students more interactively participate in the Eduwisata program when the team of the community service program guided them in learning the energy and its utilization. The well-prepared preparation of the guides for materials and modules during the explanation is the factor.

Keywords: eduwisata program, energy conservation, science

1. Introduction

Learning natural science for Elementary students is aimed to give them knowledge of the universe and the phenomena that occur in it [1]–[3]. Natural science subject that in Indonesia is subjected as Ilmu Pengetahuan Alam (IPA) becomes one of the important subjects taught at school. It gives them knowledge of natural phenomena through observation. Therefore, natural science subjects can increase the students' curiosity and interest in solving problems or practicing their critical thinking [4]–[7]. It also can encourage the students to think thoroughly and carefully and get them used to doing experiments systematically. Furthermore, they can explain the results of their experiment actually in detail. Natural science subject also encourages students to find out the facts based on the theory they have learned so that they can find the solutions or new solutions to the problems around them.

Learning science brings advantages for Elementary students in their daily life [8]–[10]. They can learn about organisms or other living things and nature, preserve, and protect nature, and conserve the environment. One of the natural science knowledge areas for students related to environment conservation is the knowledge of energy, energy sources, and its utilization [11]–[15]. Giving the students a knowledge of energy can teach them a way to save energy and utilize it wisely. Besides, they also can learn how energy transforms into another [16], [17]. It gives them further knowledge of their surroundings.

Learning natural science can be conducted everywhere including in tourist destinations such as Taman Rekreasi Sengkaling UMM. It is a tourist attraction for families with recreation and educational facilities. It provides waterpark facilities for children to mingle with family while they swim or splash in the water.

Meanwhile, Taman Rekreasi Sengkaling provides prototypes of wind turbines, generators, wind tunnel, water turbine, and Archimedes pump for educational facilities. As a part of an educational institution, Universitas Muhammadiyah Malang (UMM), Taman Rekreasi Sengkaling has a program to give knowledge on the natural sciences to the students who come to this tourist attraction. This program is named Wisata Edukasi (Eduwisata). It is an educational tour to give knowledge and understanding of science to students, especially in energy transformation.

Considering the importance of scientific knowledge for students, this community service program aims to introduce the utilization and conservation of energy for elementary students through the Eduwisata program by Taman Rekreasi Sengkaling UMM. The activities are planned to enrich the student's knowledge of the concept of energy conversion.

2. Method

In conducting the community service program, the team had planned steps of activities as depicted in the diagram of Figure 1. Those were purposed to find out solutions to the problems in giving knowledge of natural sciences to the students who visit Taman Rekreasi Sengkaling UMM.

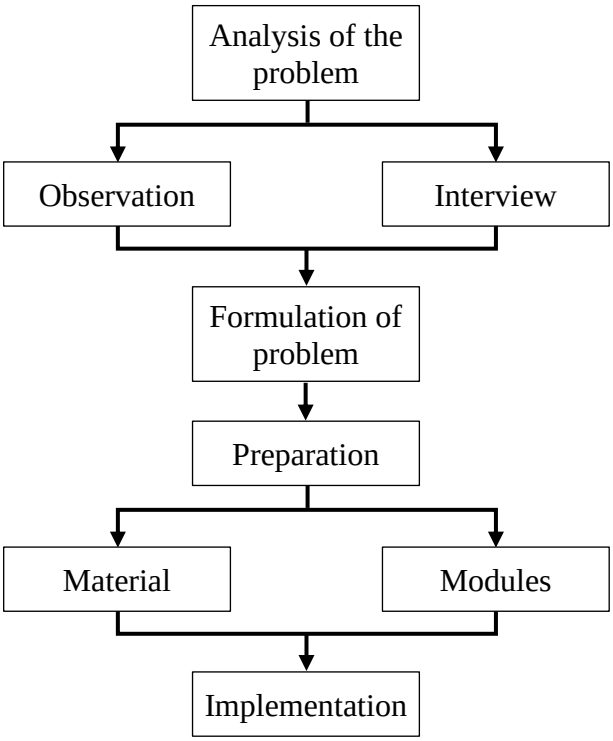


Figure 1. Activity plan of community service program

In situation analysis, the community service team observed the facilities and activities in the energy conservation station to find out the problems. It was conducted by listing the facilities in the station and activities that were conducted by the staff when they guided students in learning energy conservation. The potential problems were observed from the method of presenting the material by the staff, the availability of modules, pamphlets or posters on the props, and material

mastery of the staff as the guide. An interview was also conducted with the manager of the energy conservation station and the staff who guide the visitors in the energy conservation area. In the interview, the community service team asked a few questions related to the activities and the problems they faced in explaining energy conservation to the elementary students. Moreover, it was also to find out the information about material they want to deliver and what concept they want to explain to the students.

From the results of interview, it was transcribed and classified to formulate the problems faced by the energy conservation staff in presenting or delivering the material to the elementary students. The classification was categorized into material and delivery method of material.

Furthermore, the material of energy was decided and planned. It is planned based on the material for elementary students since the visitors to the energy conservation station are mostly elementary students. The module is designed for the staff related to the method of delivering the material. Material for the Eduwisata program is focused on energy including the use of energy, conversion, and conservation of energy. The material and module that are designed were based on the props in the energy conservation station in Taman Rekreasi Sengkaling UMM. The material planned is adapted to elementary-level learning.

In the implementation, the material and module were prepared. Furthermore, the concept of energy, its use and conservation were delivered to the students who visit the energy conservation station in Taman Rekreasi Sengkaling UMM.

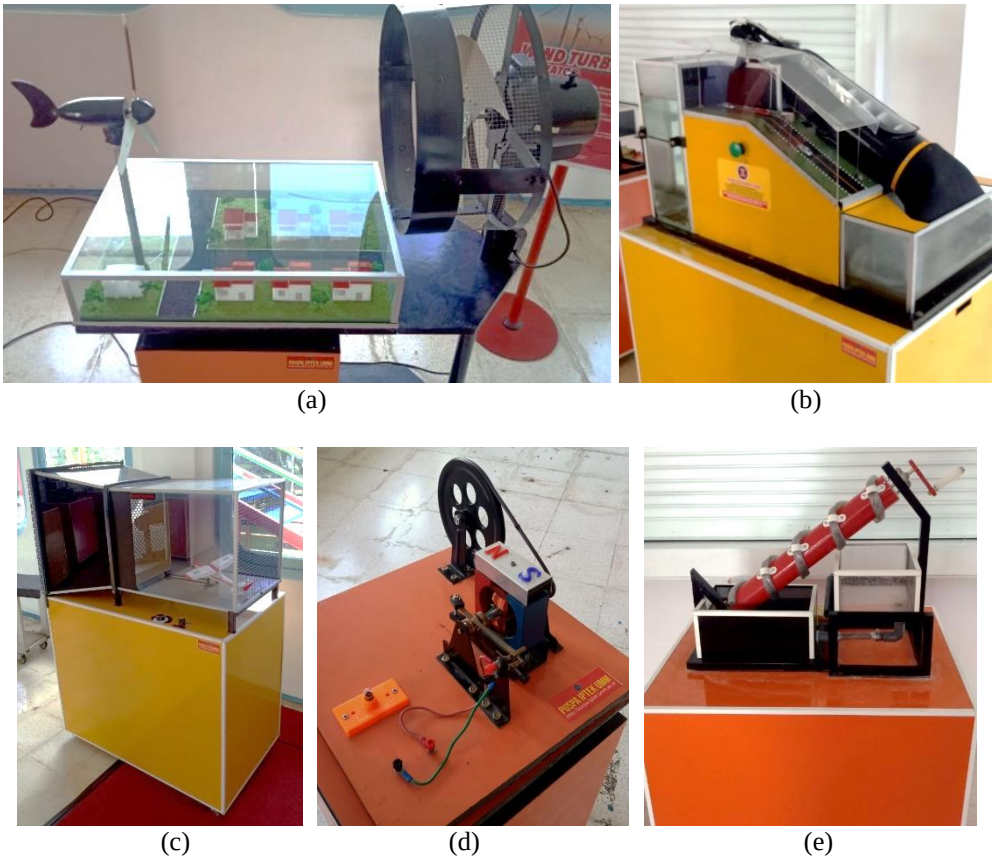
3. Result and Discussion

Energy conservation must be taught from an early age [18]–[20]. The wise use of energy will lead to the preservation of the environment and the universe. Science learning for elementary school students has been determined through the curriculum to provide knowledge about the universe and natural phenomena that occur around it. In addition, they are also taught to think critically and learn to find solutions to natural problems that occur around them.

Observation conducted by the community service team in Taman Rekreasi Sengkaling UMM showed that in the implementation of the Eduwisata program, there were still obstacles to be overcome. The staff of the energy conservation station has lack mastery of energy material and has no appropriate method of delivering the material. Therefore, the learning of energy is monotonous for students. It caused the students to be less active in interacting with the staff during the learning. Thus, the students just see the props in the energy conservation station as toys and they do not observe them related to how the props work. The unavailability of materials and modules to introduce the energy and its utilization was also a barrier for the staff to explain it to the students.

The props in energy conservation station

The preparation of material and module of energy for the staff was initiated by finding the appropriate references. It was also prepared by adapting the material to the student's level of learning and the props in the energy conservation station as depicted in Figure 2.



(a) (b)

(c) (d) (e)

Figure 2. Props in energy conservation station Taman Rekreasi Sengkaling UMM. (a) Wind turbine, (b) water turbine, (c) wind tunnel, (d) component of generator, (e) Archimedes pump

The energy conservation station of Taman Rekreasi Sengkaling UMM facilitates the visitors who are mostly elementary students with props of energy. They are wind turbine, water turbine, wind tunnel, component of generator, and Archimedes pump. Wind turbine props assist the staff to explain about the utilization of wind, which is the natural source. It is a prototype to learn the energy conversion from wind to electrical current. Meanwhile, water turbines also have the same purpose to utilize natural sources that are plentiful in nature, but it has different work and function from the wind turbine. Water turbines transform the energy of water stream into electrical current. Both turbines can assist the students to learn energy conversion.

The prototype of the wind tunnel in this facility assists the student in having knowledge of how a plane flies. It explains the utilization of wind energy to move or lift an object. The wind gives the plane thrust to go up and fly. Furthermore, the component of the generator, which is also one of the props in this facility shows the students how a generator works. Generator results in electrical energy from motion. Moreover, the Archimedes pump is the props that explain the movement of water from the bottom to the upper place. It shows the conversion of human energy to motion. The motion that is resulted in this conversion is the water stream to the upper place.

Material of energy and module

In designing the material for the Eduwisata program in Taman Rekreasi Sengkaling UMM, which is aimed at giving knowledge to the visitors of elementary students, the selection of references that is appropriate for their level of learning is required. The references are mainly based on the students' books on natural science subjects. Those are selected based on the need of the Eduwisata program that wants to give knowledge of energy.

Figure 3. Material of energy from Buku Tematik Terpadu Kurikulum 2013

The material for the elementary students who visit the energy conservation station Taman Rekreasi Sengkaling UMM was focused on energy. It includes the use of energy, conversion, and conservation of energy. The topic of energy explains

the source of energy and the kinds of energy available in nature. It also explains the way to use energy and the characteristics of energy. It explains the energy transformation into another form of energy and what alternative energy can substitute fossil fuels. The materials are aimed to solve the problem of the lack of mastery faced by the staff on the material.

In overcoming the problem of delivering material conducted by the staff, the module is prepared to help them know the appropriate method to guide the students in understanding the function of the props in the facility. It gives guidance to the staff in engaging the students in the explanation of energy. Moreover, it also assists the staff to explain the concept of energy to the elementary students interactively.

Figure 4. Delivering material on the use of energy for elementary students in the Eduwisata program Taman Rekreasi Sengkaling UMM

Well-prepared materials and module aided the staff in mastering the concept of energy. Therefore, they can explain the material to the students well while they show how the props work. An appropriate method in delivering the material to the students makes them enjoy the learning in the conservation energy station. Moreover, students participated actively in the activities, and they can interact with the staff by asking questions.

4. Conclusion

Learning natural science that focuses on energy conservation needs to be conducted. Learning from an early age is meaningful, especially for elementary students. It can be conducted by using a pleasant method of delivering material. Therefore, learning can be conducted in tourist attractions. The Eduwisata program

that is conducted by Taman Rekreasi Sengkaling UMM gives facilities to learn natural science for elementary students. They can learn about energy and the concept of using it in daily life. Yet, the lack of mastery of natural sciences faced by the staff and the unavailability of materials and modules for the students make their explanation of energy not optimum. Therefore, the community service program provides the solution by giving materials and modules to explain the conservation of energy to elementary students through the Eduwisata program Taman Rekreasi Sengkaling UMM.

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