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EVALUATION OF THE FIELD TRIPS TO ENVIRONMENTS FOR INFORMAL LEARNING: CASE OF THE 'ENERGY PARK'

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Abstract

Informal education needs to organize activities in accordance with goals as with formal education institutions and consider how efficient these activities are in reaching predetermined goals. However, the learning gains might become limited when the informal education was not organized to accompany formal education or according to the attainment targets determined. Thus, the aim of this study was to evaluate the field trip to "Energy Park" in terms of prospective science teachers' learning about some of the science concepts and their ideas about effectiveness of the field trip.

In the present study a pre-post test experimental design was benefitted. Final year prospective science teachers (n=30) participated in this study. A questionnaire was designed and used as data collection instrument. To trace the changes in their ideas the questionnaire was used prior to and after the field trip. Questionnaire possessed open ended questions, some of which asked prospective teachers' expectations from the Energy Park. The rest of the questions aimed to gauge prospective teachers' learning of the science concepts addressed during the field trip. Visual resources (such as video, photographs, etc.) were also collected and used as data source for mapping out prospective science teachers' performance during the visit. The results of the analysis indicated that field trip helped prospective teachers to progress and strengthen the scientific concepts such as bio energy and air pollution whereas they learnt new concepts such as Perlite and Zeolite.

Keywords: Energy Park, Environments for Informal Learning, Evaluation, Science and Technology Museums, Science Teaching.

INTRODUCTION

Informal learning environments which assist science education and complete the education at schools are effective in helping students gaining cognitive, emotional and psychomotor behaviors

(Tal, 2001; Tal, 2004; Rudman, 1994; Tal & Morag, 2009; Ballantyne & Packer, 2009). Students also improve their social skills by carrying out oral communication in these places. Education programs which give students the opportunity to use their sense organs more and include various group activities provide great benefits for students in connection with gaining knowledge and experience. Thus, educational programs are suggested to be planned by considering students' interests and needs, without neglecting the entertainment factor (Guisasola, Morentin & Zuza, 2005; Lemelin & Bencze, 2004).

Informal education, which is composed of an individual's interaction with his/her environment and is not planned, scheduled or controlled, is sometimes more efficient than formal education in the process of behavior change and gaining new behaviors (Wellington, 1990). Research has suggested that diversifying and increasing the frequency of activities that children are interested in strongly affects the improvement of abilities they acquire at school (Gerber, Cavallo & Marek, 2001; Hannu, 1993).

Informal education programs which are not organized in a short time and solely with the aim of entertainment are possibly be more effective. Its effectiveness possibly be increased when it is organized around predetermined set of goals and the efficiency of the activities are considered. Whether this assumption is realized is the research focus of the present study.

Purpose of Study

The aim of this study is to emphasize the importance and benefits of multi dimensional and effective learning in environments for informal learning. In this context, the Energy Park in Ankara was taken as an example. Thus, in the study the field trip to "Energy Park" was evaluated in terms of prospective science teachers' learning about some of the science concepts and their ideas about effectiveness of the field trip.

METHOD

In the present study a pre-post test experimental design was benefitted. Final year prospective science teachers (n=30) participated in this study. A questionnaire was designed and used as data collection instrument. To trace the changes in their ideas the questionnaire was used prior to and after the field trip. Questionnaire possessed open ended questions, some of which asked prospective teachers' expectations from the Energy Park. Some on the other hand asked them to describe "Which is the favorite of the exhibition or activity" by providing the reasoning behind.

The rest of the questions aimed to gauge prospective teachers' learning of the science concepts (air pollution, global warming and greenhouse effect) addressed during the field trip. Visual resources (such as video, photographs, etc.) were also collected and used as data source for mapping out prospective science teachers' performance during the visit.

Learning Environment: Energy Park, Ankara

The Energy Park, which presents energy sources and productive technologies to the younger generation, was opened means of coordination between the General Directorate for Electrical

Works Research Administration (EIE) and Ministry of Energy and Natural Sources, in the garden of the General Directorate for Mine Exploration and Research on 29 October 2004. The park established with the aim of making visitors conscious of energy, providing them with knowledge about energy sources, the energy production and consumption processes of Turkey, and introducing the institutions connected to the Ministry of Energy and Natural Sources and private sector. There are examples of energy raw materials, energy producing systems from the past to today, and educational studies creating a consciousness about energy productivity and renewable energies.

In the closed part of the park, a lot of information about renewable energy sources, fossil fuels, and mines is exhibited. In the open air exhibition area, a working miniature of Artvin- Borcka Dam, the original 42 meter high T-32 tower which was used in Batman petroleum wells between 1965 and 1997, a model of an 18 meter high and 12 meter diameter wind turbine with a production capacity of 20 kilowatts of energy per hour, miniatures of mines at Zonguldak and Tuncbilek and evacuation wagons, the original of the Horse Head face pump which is used commonly in petroleum production, and a Solar Source which presents solar energy for daily life are exhibited. In the Energy Park, there is also a library introducing the energy resources of our country, an exhibition of "Energy Usage At Home" which gives information about using energy productively and correctly at home, and a "Game area", in which the production and consumption of energy are explained by means of experiments.

FINDINGS

Evaluating the trip to Energy Park in terms of prospective teachers' learning

Prospective teachers were asked to list renewable energy sources that they know prior to and after the trip. The renewable energy sources that they wrote and their frequencies are presented in Table 1.

Table 1. The frequency values of the renewable energy sources listed

The renewable energy sources	Pre-Test n (% Frequency)	Post-Test n (% Frequency)
Wind Energy	30 (28,04)	29 (23,77)
Solar Energy	27 (25,23)	27 (22,13)
Hydraulic Energy	12 (11,21)	14 (11,48)
Geothermal Energy	23 (21,50)	25 (20,49)
Hydroelectric Energy	9 (8,41)	11 (9,02)
Bio Energy	1 (0,93)	12 (9,84)
Wave Energy	1 (0,93)	- (0,00)
Nuclear Energy	4 (3,74)	4 (3,28)

According to table 1, there is not much change in prospective teachers' list concerning renewable energy sources, apart from bio energy. Only one prospective teacher stated bio energy as a renewable energy source prior to trip. This number increased to 12 after the energy park trip. The number of prospective teachers who stated hydroelectric energy and geothermal energy was also increased, albeit to small extent, following from the energy park trip.

Questionnaire asked prospective teachers to write down the concepts or event that they have heart for the first time during the trip. Their list with frequencies can be seen in Table 2 below.

Table 2. The frequency values of concept and event that was learned or seen for the first time after the trip

Concepts and Events	n	% Frequency
Perlite	14	35,0
Zeolite	5	12,5
Boron	6	15,0
Biogas	3	7,5
Biodiesel	1	2,5
LNG	1	2,5
Electricity saving at homes	4	10,0
Mining coal, oil processing	3	7,5
Nuclear protection wall	3	7,5

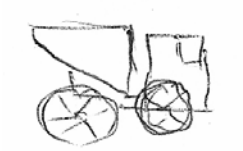
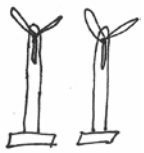
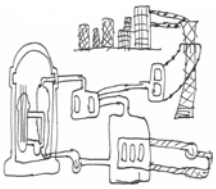
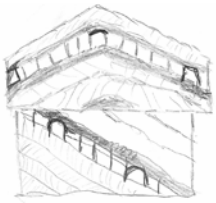
From Table 2, nearly half of the prospective teachers (n=14) stated that they heart Perlite for the first time at the trip. Zeolite and boron were the other concepts that were also stated as new concepts by nearly one sixth of the prospective teachers. Other concepts stated were biogas, biodiesel and LNG. Prospective teachers list some of the events that contributed to their existing knowledge. These were electricity saving at homes, mining coal, oil processing and nuclear protection wall.

Evaluating the trip to Energy Park through the eyes of prospective teachers

Prospective teachers were also asked to explain their feelings about the Energy Park trip. They all stated that they liked and benefitted from the trip. Some of them emphasized that they learnt new science concepts during the trip. Some on the other hand, stated that they already heart the science concepts addressed during the field trip, but they learnt how they are used. For instance, a number of prospective teachers aired that they were aware of necessity of electricity saving at home, but did not know to do so. They stressed that the energy park trip provided a model for them to adopt and use at home for saving electricity. Some of the prospective teachers aired that the trip did not only contribute to their science knowledge but it also enrich their teaching strategies. These prospective teachers underlined the role of the trip as a model in relating the science concepts with the real life materials and activities.

One of the questions required prospective teachers to draw a picture of their favorite activity at the Energy Park. Table 3 presents their drawings with related frequencies. As it can be seen from the Table 3, the most favorable activities are create battery with your hands (n=6) and Nuclear Power Plant (n=6). This was followed by Flaying Mirror (n=4) and Wind Panel Turbine (n=4). The rest activities occur in the table 3 seem to be less favorable ones as they were drawn by only one or two prospective teachers.

Table 3. The frequencies of favorite activities at the Energy Park

	Drawings		
Playing Field	Create battery with your hands (n=6) 	Flaying Mirror (n=4) 	Review ring game (n=1) 
Outdoor Area	Truck Used in Extraction (n=1) 	Wind Panel (Turbine) (n=4) 	
Renewable Energy Resources	Bio Energy (Biogas) (n=2) 	Geothermal Energy (n=1) 	
Inedible Energy Resources	Nuclear Power Plant (n=6) 	Coal Mineral Deposits (n=1) 	

DISCUSSION & CONCLUSION

It is well established that informal education through science museums, fairs and trips enhance learning in various ways including cognitive, emotional and psychomotor behaviors (Tal, 2001; Tal, 2004; Rudman, 1994; Tal & Morag, 2009; Ballantyne & Packer, 2009). This study added into this by showing that the informal learning environment (Energy Park) contributed to prospective teachers' concept learning in two ways. The first of these was helping prospective teachers learn new science concepts. The second one was conceptualizing those already known. The latter seems to contribute to not only prospective teachers' content knowledge but also to their pedagogical content knowledge (PCK).

Studies indicated that teachers do not have a clear view on how to use informal education environments; they think tours or trips are only for fun; they have difficulties in making preparations before the tour; and they do not attempt to relate the curriculum at school with the materials and activities involved in the informal education setting (Bozdogan, 2008). Preparation of new evaluations about informal education environments does not only produce information specific about the related environment both also contributes to prospective teachers' PCK, especially if educators/researchers who conducted the study have a role model for them.

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