

Electric Energy Saving

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Received: October 20, 2014 / Accepted: December 13, 2014 / Published: December 30, 2014.

Abstract: Over all fuel condition and the money we spend on the said fuel leads us to think about savings. What can we do? As individuals, we can educate our students and their family members. The easiest way to do that is to monitor their weekly spending for them. Together with their family members, the students have to monitor the consumption of electrical energy through three weeks. In the first week, they should spend electricity as they do everyday. During the second week they have the increase of spending of electrical energy. The third week is the saving energy week. They have to make a plan with their family members on how to save energy, for example, turning off the lights in the empty rooms, turning off the TV when there is no one watching it, etc.. Every week they have to note the data in kilowatts. When they acquire all the information and transform it into money they can see if it's worth saving electrical energy or not. They will see they don't have to give up the comforts of the modern life. The value of the project is in the fact that many households continue with the electrical energy saving. In fact, the number of the households is increasing.

Key words: Electrical energy, saving, education.

1. Introduction

In the school's biology curriculum, there is a lesson called "Saving energy". However, no matter what we say about saving energy it doesn't seem to make any difference in the students' attitudes towards it.

The aim of this project is for the students and their families to learn the importance of changing their attitude towards energy. For starters, we came up with a mini project for the pupils. Every pupil has to present their project to their family. The project can be done only in cooperation with the family members.

2. Materials and Methods

Each student's assignment was to monitor and note the electric energy consumption in their household for three weeks. In the first week they should spend electric as they do every day. During the second week they have the increase of spending of electrical energy due to Christmas and New Year holidays: baking,

cooking, decorating their homes with lights, etc.. The third week is the saving energy week. They have to make a plan with their family members on how to save energy. They have to note all the data in a table, calculate how much energy was spending each week and how much money was spending each week. Then, they have to calculate monthly and yearly cost. They will note big differences. After they get the results, family members will notice that they will save money if they stick to certain actions through the year. After that, members of the household have to reach a conclusion, and the student should have to present their projects to other students. Family members realize that they have to turn off the lights in empty rooms, and adjust the voltage of the light bulbs to the space it illuminates. Also, they learn to turn off the TV if no one is watching it, and to remove various chargers from the outlets after devices have finished charging, for example, mobiles. They need to use cheaper electricity (during the evening and night hours) when using machines that don't need to work during the day, for example, a washing machine (Fig. 1).

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Graphic representation of electricity spending

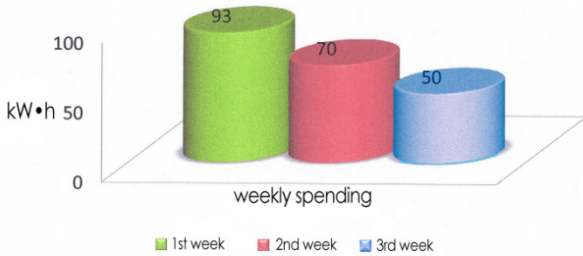


Fig. 1 Graphical representation of spending electricity.

3. Results and Discussion

Families that partake in the project that to fill out a survey at the beginning and on eat the end of the project. The analysis has shown that many families pay more attention to energy saving after this project, for example, buying energy saving bulbs, and energy efficient household machines, changing their everyday habits to save energy, etc.. Families have reached the conclusion that they can save energy and not give up the comforts of the modern times.

Survey questions were conducted before performing the project, after the project was concluded and the results of survey analysis.

1. Do you know the costs of electricity consumption in your household?

	Before	After
YES	58.33%	78.26%
NO	23.61%	8.69%
It is not important	18.06%	13.04%

2. Do you take any action to reduce your electricity consumption costs?

	Before	After
YES	45.83%	80.43%
NO	38.89%	6.52%
It is not important	15.28%	8.69%
Didn't answer	None	24.35%

3. Do you take any measures to save energy? (participants gave their own answers with multiple examples)

	Before	After
Energy saving light bulbs	52.78%	67.39%
Using inexpensive EE (electrical energy) tariffs	40.28%	71.73%
Choosing economical devices	None	13.04%
Turning the lights off	31.94%	50.00%
Turning the TV off	12.5%	32.61%
Turning the computer off	None	23.91%
Nothing	None	20.83%

4. Do you believe you are not succeeding in your attempts to save electrical energy and why (list your reasons)?

	Before	After
We succeed	36.11%	50.00%
We try to save energy but we don't succeed	38.89%	23.91%
We don't save energy	16.67%	17.39%
Didn't answer	8.33%	8.69%

5. What would motivate you the most to take energy saving measures that you think are necessary in your own home? (participants circled multiple answers)

	Before	After
Less cost	63.89%	84.78%
Environmental awareness	44.44%	76.08%
Other	15.28%	8.69%

6. Does the mobilephone charger spend electrical energy even though it is not plugged into the phone, just into the plug?

	Before	After
YES	44.44%	80.43%
NO	52.78%	17.39%

Didn't answer 2.77% None

7. How do you dress during the winter months while in your home? (participants gave their own answers)

	Before	After
Light	27.78%	43.48%
Short sleeves	23.61%	30.43%
Long sleeves	34.72%	None
Layers	15.28%	26.09%

8. Is your house/apartment the rmally insulated?

	Before	After
YES	None	55.56%
NO	None	44.44%

9. Do you have advice that measure she at energy consumption in your household?

YES	28.83%
NO	79.17%

10. What kind of an electric meter do you have in your home?

Single-tariff	34.72%
Two-tariff	66.67%

11. How many energy saving light bulbs do you have in your house/apartment?

	Before	After
0	44.43%	15.22%
Less than 5	30.25%	39.13%
More than 5	25.32%	45.65%

12. Would you install solar panels in your home?

	Before	After
YES	52.78%	80.43%
NO	47.22%	19.56%

It can be seen from the answers to the survey questions that after the project has been concluded, household members (including the children) change their attitudes towards electric energy consumption. To be able to conduct the project with quality, the participants had to be educated not only through school workshops but also through literature. These measures definitely attributed to the reduction of their energy consumption costs but also to their greater environmental awareness. That result shows the

projects long-term value.

The authors have been conducting these mini projects with our students in our school for seven years. The effects are visible in the younger students of the same family.

Students encouraged us to expand the project to our school. The authors pay attention to saving electrical energy like turning off the lights in the classroom after lessons and in the hall during the lessons. We noticed the saving of electrical energy in school, too.

Enriching the knowledge of our pupils made the project grow. Moreover, our students came up with and held workshops for first graders and second graders, for children in kinder gartens, and even for their grandparents (Figs. 4-5).

During the implementation of the project the students came up with a mascot they called "Štedljivko" (roughly translates as penny-wise) (Fig. 6). They made the mascot from various materials and showed it on the exhibit.

Students created the flyer with all the necessary instruction for energy saving and gave it out to visitors of the exhibit and participants of the workshops.

4. Conclusions

Zagrebhosts Zagreb's energy week during which there are all kinds of events on different city locations, schools, squares, and companies who work in electricity



Fig. 2 Exhibition of the development of Zagreb's lighting.



Fig. 3 Children's work in the exhibition.



Fig. 4 Workshop for the first grade pupils.



Fig. 5 Workshop for the kinder garten kids.

hold conferences, so the school joined them and organized an event.

During Zagreb's energy week, our school held an open exhibit called "Svjetla Zagreba" for public,



Fig. 6 The picture of the mascot.



Fig. 7 Opening of the exhibition "Svjetla Zagreba".

which displayed the development of city lights from the year 1900 till today, Figs. 2, 3 and 7.

The authors cooperated with Cvjetno Naselje Elementary School, and we hope the project will spread to other schools, considering the fact that some schools already contacted us and offered their help in implementing the project. That would make the result of the project greater because more people would be included.

Taking into consideration that the value of our project was recognized by certain government organizations, we are hopeful that it will help us achieve our school's goal, to place solar panels on our school to further save energy.

The authors are currently working on brochures that will present our students' work, and help other schools which wish to give this project a try.

Acknowledgments

The authors are grateful to all the pupils and their parents on their support in implementing this project that no one has done before.

The authors are grateful to all the employees of Sesvetska Sela Elementary School, led by our principal Gordana Vojnović, for all their understanding and selfless support.

Thank you Valentina Ćosić for translating this project into English.

The authors would also like to thank Gradska Pinara Zagreb, Elektra Zagreb, Tvornica električnih žarulja Zagreb and City office for energetics, environment protection and sustainable development for all their support and help.

Lastly, The big thanks goes to Education and Teacher Trainer Agency for financing the publishing of this project.

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