

## Use Of Alternative Energy Sources In Explaining Materials On Interdisciplinary Integration To Students

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### **Abstract**

*The following article deals with an overview of ecological and environmental problems and the ways to solve problems using alternative energy sources on the basis of interdisciplinary integration on the example of various topics on Ecology and Physics subjects. The use of modern technologies in the process of organizing education shows and develops in students who are mastering a subject such abilities as: interests, worldview, lifestyle, mood, professional and mental thinking. When performing the educational process on the basis of intersubject integration and integrative approach, teachers in the conduct of their activities, there are the following opportunities for professional development:*

- *to introduce intersubject integration in each theme;*
- *to provide an interesting, not chargeable learning system;*
- *to create training materials for reusable use;*
- *to organize such an educational process where students can turn to educational materials at any time;*
- *to prepare multimedia materials explaining the content of the topic;*
- *to exchange experience with other teachers via the Internet;*
- *effectively leading, managing and storing the work of students, as well as saving time [5, p. 42-43].*

*At the lessons of "Ecology", using intersubject integration, you can provide data on areas of research work to protect the environment that are currently actual; about natural resources and their varieties; about natural resources and problems of their use; environmental issues; about the main directions of the environmental problem and tasks for solving these problems, etc.*

*The topic "Directions of ongoing research work to protect the environment" states that large-scale work is being carried out in the republic to protect the environment from industrial pollution [8, p. 127]. The data on the adopted laws on the protection of animal and plant worlds, soil, groundwater, atmospheric air; as well as codes of the Earth, water, forests, underground wealth.*

**Key words:** *intersubject integration, natural resources, alternative energy sources, natural processes, energy and environmental problems, condensation, evaporation, knowledge.*

### **INTRODUCTION**

The use of alternative energy sources as a teaching tool in the implementation of interdisciplinary integration in the education system implies the implementation of tasks such as professional orientation, educational continuity, interdisciplinary relevance, students' interest in the studied material, the implementation of polytechnic education.

The following article in some extent serves as implementation of the resolutions of the President of the Republic of Uzbekistan that was adopted on May 26, 2017 No PP-3012 "On the program of measures for further development of renewable energy, energy efficiency in the economy and social spheres in 2017-2021" [1], November 8, 2017 PP-3151- Resolution "On measures to ensure the rational use of energy resources" [2], February 7, 2017 № PF-4947 "On the Action Strategy for the further development of the Republic of Uzbekistan" [3] and the Law of the Republic of Uzbekistan № LRU-539 of May 21, 2019 "On the Use of Renewable Energy Sources" [4].

The use of alternative energy sources as a teaching tool in the explanation of teaching materials in the natural sciences increases students' mastery, strengthens knowledge, develops logical thinking and creative skills, saves time in mastering the topic, serves to develop independent work skills and competencies.

Based on the ideas above, it shows that a number of tasks need to be performed to explain the use of alternative energy sources as a learning tool in the interpretation of training materials. In particular, it is necessary to acquaint students with the achievements of science and technology, to apply their knowledge in practice.

## **METHODOLOGY**

On the basis of the method of analysis, textbooks, manuals, scientific and methodological literature on the use of alternative energy sources as a teaching tool were systematically analyzed, best pedagogical practices were studied and ideas were collected.

On the basis of the observation method, the process of organization and teaching of Physics, Chemistry, Biology, Ecology and Geography in secondary schools and vocational colleges was observed.

On the basis of the method of comparison, the methodological basis of the use of electronic textbooks, multimedia software in Physics, Chemistry, Biology, Ecology, Geography and the didactic possibilities of teaching based on them were compared.

On the basis of the experimental method, the current normative documents on the organization of the educational process in secondary schools, vocational colleges and the experience of teachers with advanced experience working in educational institutions were studied, prepared on the basis of computer programs in Physics, Chemistry, Biology, Ecology, and Geography. Presentation materials, animations of processes on devices, educational films, multimedia electronic manuals, electronic copies of lectures, and practical trainings were organized and conducted.

## **STATEMENT OF THE PROBLEM**

Also, information is provided that specific tasks have been given to relevant organizations, enterprises, and measures have been recommended for the rational use of air pools, mineral resources, soil, water, forests, including the environment.

In the process of conducting this lesson, along with the above mentioned, you can provide data on the use of alternative energy sources. Currently, on Earth, the need for energy is covered by natural fuels, in particular by burning coal, oil, natural gas and etc. Natural fuels, for about another ten years, will serve as the main source of energy. And then, you have to look for other, alternative ways to get energy.

In addition to natural fuels, there is another source of energy, this is hydroelectric stations. But, to build such stations, you will have to sacrifice many hectares of forest, pasture and fertile land. The artificial seas of these hydropower plants can flood these fields. And all the lands around such artificial seas become unusable due to rising groundwater levels.

But, life is progressing. The need for energy in the national economy is growing and this creates a demand for searching new and new directions of energy sources [6, p. 17].

Firstly, now the attention of many scientists and researchers is paid to the problems of using the so-called non-traditional, "recoverable energy sources", and this is the Sun, wind, geothermal, rising or lowering of sea water level and others. So far, these types of energy are used little in the national economy. But, it should be noted that a lot of interesting design works has been carried out to launch them in practice, the possibilities for obtaining and using energy can radically change.

Secondly, the relocation of the locations of new fuel reserves to the northeast, difficult climatic conditions, the complication of geological research, difficult conditions in the sources of fuel

production, insufficient material and technical support greatly complicate the extraction of energy raw materials. As a result of mentioned above increases the cost of energy raw materials.

Thirdly, a large amount of fuel is used, which is not enough in the national economy - oil and gas.

Fourthly, the energy value and quality of coal have deteriorated. In the future, the more low-quality fuel may be used, the more this problem will be exacerbated.

Fifthly, as a result of energy consumption, the level of environmental pollution is greatly increased.

The presence of such problems requires a wide development of technologies of traditional energy sources.

Nowadays, quite a lot of technologies have been proposed in the field of using alternative energy sources and it is already possible to successfully apply them in life.

The main directions of research and development of alternative energy sources consist of the following:

- a) creating, producing and launching of new types of solar power plants with steam turbines;
- b) developing and designing of autonomous (for photoelectric consumers) devices;
- c) designing, installing of heating and cooling systems, also providing hot water, working on the basis of solar energy;
- d) constructing and launching of solar thermal power plants;
- e) designing, installing of geothermal devices;
- f) designing of wind power plants and wind power units, as well as their introduction into production;
- g) developing of the use of biogas energy [7, p. 6].

Of course, there are many sources which you can get fuel, electricity in an unconventional way and which can replace them. But, among them it is necessary to choose the most effective, low-cost and environmentally safety type. If you take from this point of view, wind energy has several advantages.

In the topic "Issues of Nature Protection" of the subject of Ecology, information is provided that nature protection is the rational use of natural resources in order to satisfy the moral and material needs of the modern generation of mankind and the future generation, their conservation and restoration; creating convenient conditions for the life of human society, protecting the environment from pollution and in aggregate, these are the measures applied for these purposes by the state and the planned system of social events [10, p. 148].

In the process of covering this topic, using intersubject integration, we can cite the following data on alternative energy sources: one of the most significant problems of mankind is the problem of energy supply. Today, the need for energy is covered by energy extracted from fossil fuels: coal, oil, natural gas and others. According to experts, annually, as a result of using natural fuels, hard particles, sulfur gas, carbon oxides, nitrogen oxides, and others are emitted into the atmosphere. The harmful gases emitted by devices operating on the basis of fossil fuels cause a serious blow to the environment. As a result of burning this type of fuel, sulfur, nitrogen, carbon oxides and other wastes are emitted into the environment [8, p. 127].

Even the reason for the rise in temperature on Earth, in other words, global warming is the result of burning fossil fuels and the release of gas waste. In addition, these wastes are mixed with rainwater and converted into acidic compounds. And then, as part of the rain, they fall to the ground and infect the soil and plants. As a result of the increase in the amount of such acids, heavy metals may contain into food products and, as a result, this food may negatively affect to the human body.

Climate warming leads to the fact that huge clods of ice are melting rapidly, and the water level of the world's oceans rises. It is hard to imagine what kind of change this will lead to. This problem can be neutralized by reducing the amount of emissions into the atmosphere - anhydride carbonate gas and other pollutants, as well as providing a balance of carbon rotation in nature.

The study of the subject of physics, integrating it with technical subjects, has a beneficial effect on the development of the subject by students. The integration of these subjects is carried out in the

following ways: teacher presentation, solving technical problems, the process of laboratory work, extracurricular activities, teaching students to build models of some technical devices, etc [9, p. 83].

When conducting a lesson on any topic, first of all, experiments and observations are carried out, and then summarizing of all them they get a generalized result.

Pupils must master the subject of physics, which is developing every day and forms the basis of the natural sciences. Nowadays it is required to arise interest in science in them, to acquaint them with new inventions, research in the field of physics and also to give them an education based on integrations with technical subjects [13].

If the teacher organizes the lesson process on the basis of visual aids, this will help students quickly and easily understand the essence of the topics. When the lesson is conducted on the basis of visual aids, students not only firmly master the knowledge provided, but also learn how to connect the knowledge gained with production, with different branches of technology. Leading a lesson in this way and using data on alternative energy sources creates great opportunities for the teacher.

In the system of lifelong education, when data on alternative energy sources are given in a physics lesson, it is necessary to explain to students the practical importance of using this kind of energy in the life of mankind, to tell about various devices and principles of their work, areas of application about the use of this energy in various areas of production, that the use of alternative energy sources devices helps in agriculture and leads to increase agricultural fruitfulness and all of the above has physical foundations. In addition, you can use these devices in the classroom, and as a result of this, students show interest in building models of various devices.

## RESULTS

In the process of conducting the topics “Evaporation and Condensation”, “Saturated and unsaturated vapors”, you can use, along with other examples, information about solar technology.

The transition of matter into a state of vapor (gas) is called evaporation. The teacher explains evaporation with a few examples. In the process of explaining the topic, using examples, you can provide information about the Saltwater desalination plant and how they work .

Also, it can be used as examples: evaporation of water in a solar water desalination plant; The process of the solar dryer of fruits and astrakhan. The amount of heat required to convert 1 kg of liquid into steam at a constant temperature is called the specific heat of vaporization and is marked with the letter  $r$ :

$$r = \frac{Q}{m}$$

Here,  $Q$  is the amount of heat,  $m$  is the mass of the liquid [6, p. 19].

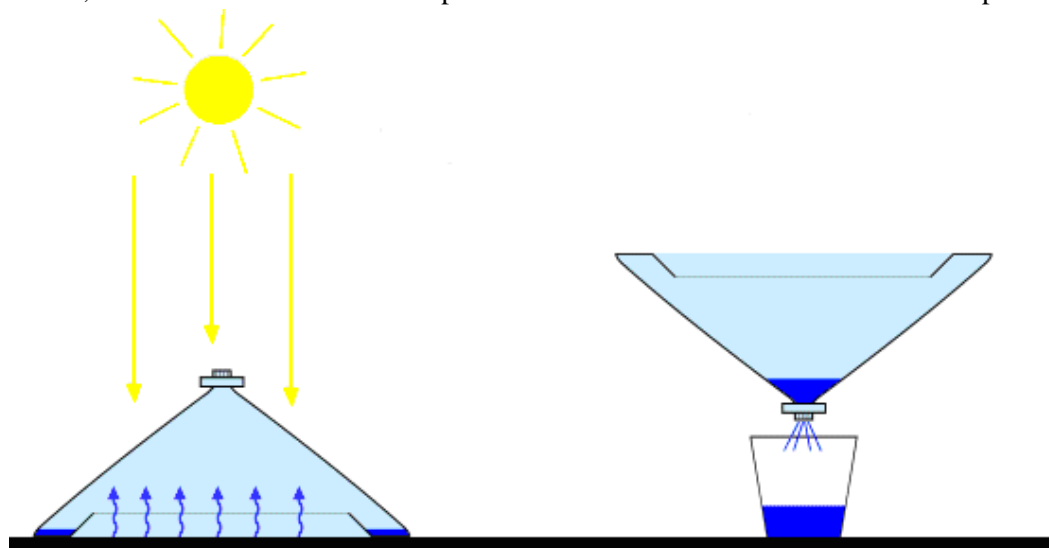
The dimension of specific heat of vaporization in the SI system is  $J / kg$ .

$$r = \frac{Q}{m} = \frac{1J}{1kg} = 1 \frac{J}{kg}$$

**Condensation.** In order to vaporize a liquid, it needs to transfer a certain amount of heat, and in case of vapor condensation gives a certain amount of heat to the environment. The state of steam, which, when cooled or compressed, passes into a liquid, or a crystal is called **condensation**.

Condensation occurs in two ways. When vapor molecules fall into the sphere of influence of liquid molecules, they cool. As a result of this, the energies of the vapor molecules decrease and when they are combined, they create droplets that fall back into the liquid [14, p. 67]. Along with explanations about the state of condensation, on the basis of examples of nature, several examples can be given about solar desalination plants, solar farms, and solar dryers. If the fluid is dynamically balanced with steam, then this is called saturated steam .

Solar water heaters have a large stock of freshwater and are found in areas where fresh water is needed (Fig. 2). This device is designed to extract potable water from saline water by sunlight. Throughout the world, distilled drinking water is ~ 60% extracted by heat evaporation and condensation [11, p. 177]. This method is based on the evaporation of salty sea water from the natural environment, as rain and snow. A cone-shaped water vacuum cleaner works on the same principle.



**Figure 2: Principle of device operation**

It consists of a simple cone-shaped plastic transparent bowl. Condensed water enters and collects fresh water in the bath below the cone tank walls. To improve the efficiency of the process, the cone is sealed to prevent water vapor from escaping and temperature fluctuations. To get ready fresh water, simply slide the cone to one side and remove the plug from the reservoir and pour the water into the container.

The cone sunscreen should be placed on a wet surface on saline. Naturally, the surface should be quiet, without any waves, otherwise salt and fresh water will mix in each other. The bottom of the cone must be darkened to achieve effective results. Such water purifiers are widely manufactured internationally; It is recommended that the tapered device be installed at 80 cm in diameter, 78 degrees at a distance of 33.3 degrees centimeters to produce 1-1.5 liters of pure water per hour. The device can operate freely at 40% of the cones at night due to the difference in ambient temperature inside and outside the container. Such inexpensive and convenient devices are now widely used.

With the ever-increasing demand for fresh water worldwide, the demand for its generating devices is also increasing. It is particularly important that such devices operate on natural or alternative sources of energy (solar, wind, or river water) without the need for electricity or heat. At present, great attention is paid to the manufacture of devices suitable for the population.

### **Conclusion**

An explanation of information about alternative energy sources from the point of view of physics will help students: firstly, to substantiate the problem from a scientific point of view; secondly, to have a complete understanding of the important branches of modern science; thirdly, to be able to apply the obtained theoretical knowledge in practice. Information about alternative energy sources is interconnected with the topics of the physics course and will help explain the introduction of subject laws to the technique [12, p. 9].

When teaching natural sciences, the use of inter subject integration increases the level of academic achievement of students, strengthens their knowledge, develops the ability of logical and creative

thinking, saves time for mastering the topic, forms the skills of independent work, as well as the scientific worldview, improves the educational process and its optimal organization.

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