

USING OF ALTERNATIVE ENERGY SOURCES IN THE DEVELOPMENT OF STUDENTS' CREATIVITY

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ABSTRACT

The following article deals with a systematic analysis of the opportunities of using alternative energy sources in the development of students' creative abilities, as well as information about innovative techniques and technologies currently used in various industries in the classroom and extracurricular activities in Physics and Technology subjects. The pedagogical possibilities of developing students' creative abilities through the design, construction and modeling of alternative energy sources in the education system have been studied. In general secondary schools, in the process of teaching Physics and Technology subjects, the student should be able to think technically in the independent design and construction of a new product of a certain type, in order to understand the essence of the problem or task, think, visualize the shape of the object and prepare it in practice. The development of recommendations for the development of performance skills are pedagogically based as well. In the organization of practical, creative work of students in Physics and Technology classes are recommended methods of developing the structure of products, assembling their parts, materials used in their manufacture, types of tools and methods of work, the level of properties of products from simple to complex. Students were informed about the current challenges of using alternative energy sources in the development of creative abilities of students in the process of performing practical creative work in the classroom and extracurricular activities.

Keywords: Creativity, Physics, Technology, alternative energy sources devices, design, construction, technical thinking.

INTRODUCTION

The development of creative abilities of students requires the development of technology, creative abilities through the application of modern energy, science and technology, the main directions of development of society, the practical application of polytechnic education, as well as the use of alternative energy sources.

The following article is devoted to the implementation of the tasks of the decree of the President of the Republic of Uzbekistan dated April 29, 2019 № PF-5712 "On approval of the Concept of development of the public education system of the Republic of Uzbekistan until 2030" [1]; decree that was adapted on May 21, 2019 № URQ-539 "On the use of renewable energy sources" [2]; decree of the President of the Republic of Uzbekistan № PF-5815 which was adapted on September 9, 2019 "On the establishment of the Agency for the Development of the Presidential Specialized Schools under the Cabinet of Ministers of the Republic of Uzbekistan"[3]; the resolution that was adapted on September 30, 2019 № PP-4467 "On measures to radically increase the effectiveness of out-of-school education"[4]; and the Resolution of the Government of the Republic of Uzbekistan dated November 26, 2019 № PP-4537 "On measures to organize modern schools".

The use of alternative energy sources in the development of creative abilities of students provides the basis for the material means of involving students in creative activities, as well as the development of scientific and methodological systems that ensure their effective use, the development of creative technology.

Based on the above, the use of alternative energy sources in the development of creative abilities of students requires a number of tasks in order to pedagogically involve students in a particular creative activity, to develop the content of this activity, methods and conditions of its organization.

LITERATURE REVIEW

Design and manufacture of alternative energy sources: solar water heaters, solar water heaters, solar fruit dryers, solar greenhouses, as well as information on scientific and technical achievements in the development of creative abilities of students in Physics and Technology classes and extracurricular activities in secondary schools are the most important tasks in teaching.

The Action Strategy of the Republic of Uzbekistan for 2017-2021 includes five priorities: "Support and realization of the creative and intellectual potential of the younger generation, the formation of a healthy lifestyle among children and adolescents, their involvement in physical culture and sports". [6]

At present, the use of innovative educational technologies, taking into account the achievements of modern science and technology, plays an important role in the development of creative abilities of students in general secondary schools.

Based on the above tasks, it is necessary to create a system of using alternative energy sources in the development of creative abilities of students, the development of scientific and methodological bases for the development of creative abilities, and the development of students' inventive competencies as well.

The textbook "Physical bases of solar energy use" written by B.Khayriddinov, N.Kholmiraev, B.Sattorov considers the possibility of using heliotechnical materials in the process of describing teaching materials, including in the course of strengthening the lesson. The textbook describes the structure and operation of solar devices and equipment, which can be cited as an example at the same time. As a teacher gives an example in order, then he must have a complete knowledge and understanding of solar devices. Extended, experience-based, scientific data have been provided to give a complete picture of the structure and operation of devices such as solar water heaters, solar water heaters, solar dryers, solar panels, solar coolers [16,5p.]. While this information provides the ability to design and build alternative energy sources, it does not allow students to fully demonstrate their creative abilities.

In the textbook "Alternative energy sources" written by S.K.Kakhkhorov, H.O.Juraev, the existing energy sources on earth are divided into two types: non-renewable and renewable (alternative). Non-renewable sources of energy are the types of fossil fuels: mainly oil, gas, coal, peat. Alternative energy sources include data on the types of energy that are permanently present in the biosphere: solar, wind, biomass, ocean and sea waves, and the hydropower of rivers [9, 4p.]. The information presented in this textbook does not provide a complete picture of the implementation of students' creative abilities.

METHODOLOGY

On the basis of the method of analysis, textbooks, manuals, scientific and methodological literature on the use of alternative energy sources in the development of creative abilities of students were systematically analyzed and best pedagogical practices were studied and ideas were collected.

Based on the observation method, the organization of in-class and out-of-class lessons in physics and technology taught in secondary schools and the process of conducting lessons were observed.

Based on the method of comparison, the methodological bases of the use of alternative energy sources in the development of creative abilities of students in physics and technology classes 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 general secondary schools and the experience of teachers with advanced experience working in educational institutions, presentation materials prepared on the basis of computer programs in physics, technology, technical drawings of alternative energy sources, theoretical and practical training was organized and conducted using multimedia electronic manuals on their structure and operation, electronic copies of lecture materials.

STATEMENT OF THE PROBLEM

Creative activity or creativity is an extremely broad concept that can be divided into areas such as scientific, artistic, technical, and practical creativity. Creativity is the level of this ability, the development of which is closely linked to the individual mental state, initiative, independence of each person. This situation is important for students to master the basics of science, choose a profession and achieve great success in their future chosen professions. Although the textbooks and manuals currently used in the education system are the basis for introducing the fundamental foundations of science, they cannot provide information on technology to develop students' creative abilities in sync with modern scientific and technical achievements.

A number of studies have been conducted on the use of alternative energy sources as a teaching tool in the integrated teaching of natural sciences in the education system. Methodical recommendations on the use of alternative energy sources as a teaching tool on the basis of interdisciplinary integration in the interpretation of the content of teaching materials in physics, chemistry, biology, ecology [7, 42p.], [8, 87p.], [10, 127p.], [11, 83p.]. As a result of the analysis of these studies, the provision of information to students in the design and construction of devices based on various alternative energy sources in the classroom and extracurricular activities in physics and technology plays an important role in developing creative skills in students.

RESULTS

One of the alternative energy source devices that can be used in the education system to develop students' creative abilities is the Solar mini fruit - vegetable dryer - greenhouse device. This device can be easily designed and built by students themselves [13,87p.]. Here is information about this device. Solar mini fruit - vegetable dryer - a greenhouse device designed to quickly and efficiently dry enough fruits and vegetables for the family throughout the season and grow greens and seedlings in winter and early spring. The front wall and clear glass covered, length

1500 mm, width 720 mm, front 600 mm, rear consists of a “hot box” with a wall height of 900 mm (Figure1).

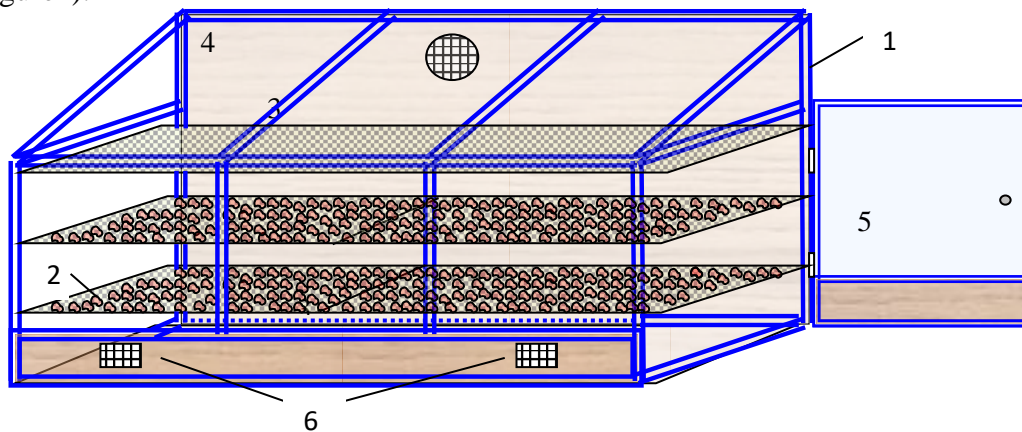


Figure 1. Scheme of solar mini fruit-vegetable dryer-greenhouse device: 1 - wooden frame covered with glass; 2 - net trays for spreading dried fruits and vegetables; 3 - net umbrella; 4, 6 - windows providing natural air exchange; 5 - Glass door of the device.

On both sides of the device there are glass-framed doors and mesh windows that provide natural ventilation. The device chamber is equipped with three rows of sliding mesh racks. The surface of each row of racks is 1 m. sq. (from two 0.5 m. sq. m.), the product to be dried is placed at the bottom of the two rows. The above rack serves as an umbrella to protect the product from direct sunlight, in some cases it is also possible to dry fruits and vegetables. The device is lightweight (around 15 kg) and compact, it can be installed in any place in the yard where the sun shines.

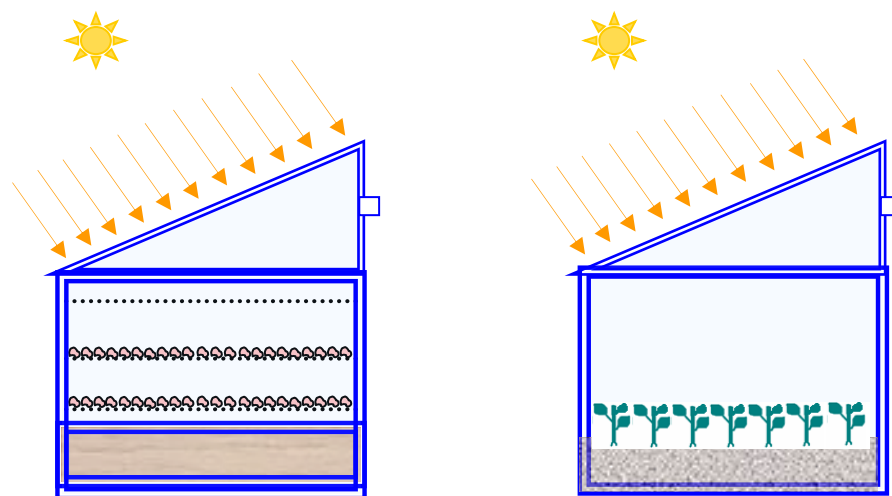


Figure 2. Summer and winter operating modes of the device.

After washing, the dried product is placed on racks, doors and windows are closed and burned. Sunlight enters the device chamber through the glass and is absorbed into its parts and fruits and vegetables into heat energy. When the temperature inside the device starts to rise from 50-55° C, the mesh window opens. When the products are dry, they are removed from the racks and the device is prepared for the next operation.

Installed in a sunny and rain-free place, this device can be used as a greenhouse in winter and early spring. To do this, racks are removed, the boxes under it are filled with fertile soil and seedlings and greens are grown. The device can be made more compact, lightweight and

efficient using modern materials. At present, combined dryers have been created with automatic control of temperature and humidity, which work continuously throughout the day [14, 9 p.], [15].

Depending on the type of product (apricots, cherries, apples, figs, tomatoes, melons, different varieties of grapes, etc.), the construction process takes 2-6 days, which is 2-3 times faster than drying in the open field. At the same time the quality of the product is high. Depending on the ripening and season of the product at the expense of each square meter of surface of the device - 25-30 kg of apricots, 10-15 kg of cherries, 25-30 kg of tomatoes, 25 - 30 kg of raisins, 5-10 kg of melons, etc. can be prepared. The device has the ability to grow 4-5 kg of edible greens in winter and early spring, or to grow 1800-2000 seedlings (tomatoes, peppers and others).

Such compact, simple devices can be prepared by students independently based on the appropriate instructions of the teacher. This, in turn, creates the basis for the development of creative abilities of students.

CONCLUSIONS

The use of information on the structure and operation of alternative energy sources devices in the classroom develops students' creative skills, their ability to design and build various devices.

The use of alternative energy source devices in the development of creative abilities of students serves to improve the competencies on modern tools and their use in everyday life.

The use of alternative energy sources allows students to solve practical problems in everyday life and society, use knowledge of Physics and other sciences to explain the operation of technical means, rational use of natural resources and environmental protection, develop intellectual and creative skills.

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