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EDITORIAL

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DEVELOPING STUDENTS' TECHNICAL CREATIVITY THROUGH COMPARATIVE ENERGY SOURCES DEVICES

Juraev Khusniddin Oltinboyevich
Doctor of Pedagogical Sciences, Associate Professor, Dean of Physics and Mathematics faculty
Bukhara State University

Kurbonov Mirzaakhmad
Doctor of Pedagogical Sciences, Professor of Physics and Teaching Methods, National University of Uzbekistan

Ajieva Muhabbat Bakhtibayevna
Docent of "Chemistry teaching methodology" department Nukus Pedagogical Institute

Khamdamova Nozima Mukimovna
Doctor of Philosophy in Pedagogy, Teacher of Pedagogical Institute, Bukhara State University

Abstract – The development of technical skills is necessary not only for professionals in this field, but also for students who do not intend to connect their professional activities with modern techniques and technologies, because the availability of such skills is important to solve problems with modern tools used in everyday life. The development of technical creativity of students around the world is based on modern techniques, innovative technologies. Modern knowledge plays an important role in the formation of a person throughout his life as a professional, personal experience and a well-rounded person.

Key words: technical creativity, technique, technology, modern means, alternative energy sources, physical phenomena.

I. Introduction

Physics plays an important role in the development of modern techniques. Physical knowledge is an important component not only of the whole society, but also of the modern culture of each individual, especially since the subsequent professional activity of this person is related to science, technology and production technology. In particular, in the Incheon Declaration and the International Education Development Action Plan "Education-2030", the personal experience gained during independent activities in physics and the skills and abilities acquired by students in the study of physics play an important role in their formation as individuals. The development of technical skills is necessary not only for professionals in this field, but also for students

who do not intend to connect their professional activities with modern techniques and technologies, because the availability of such skills is important to solve problems with modern tools used in everyday life.

II. Literature review

The role of physics in the rapid development of modern technology is enormous. Physical knowledge, discoveries, research and methods are an important part of the modern culture not only of the whole society but of each individual. The path of human life is directly compatible with science, technology and production technology.

In physics lessons and extracurricular activities, the teacher's personal experience gained during his / her work, as well as the knowledge, skills and abilities acquired by students as a result of studying physics, play an important role in their formation and development as a harmonious, perfect person.

The need to educate students in the spirit of respect for the inventors of technology and technology, to teach them to solve practical problems in everyday life, to use natural resources and to protect the environment, understanding the laws of operation of technical means in the development of their technical creativity in physics classes available.

III. Analysis

It is important to develop technical creativity of students in physics classes in general secondary schools, to form technical skills in them, to increase their interest in technical specialties, to make conscious choices in technical specialties, to direct them to higher education in technical specialties. Improving the ways of developing students' technical creativity, forms and methods of teaching, teaching methods and mechanisms on the basis of innovative technologies is of great importance in the lessons of physics.

Improving the opportunities of physics education through the use of innovative educational technologies, creative teaching methods and modern didactic tools so that students have the necessary competencies in fundamental natural sciences such as mathematics, physics, chemistry, biology in the development of technical creativity requires.

The need to educate students in the spirit of respect for the inventors of technology and technology, to teach them to solve practical problems in everyday life, to use natural resources and to protect the environment, understanding the laws of operation of technical means in the development of their technical creativity in physics classes available.

In the development of technical creativity competencies of students in physics classes, the teacher first organizes the search for teaching materials in the classroom to study the structure and operation of devices related to alternative energy sources.

The device design plan for students in the circle can be implemented in the following order:

1. To have information about the intended use of the device for which the design is intended.
2. Have an idea of the structure of the device, its main parts.
3. Knowledge of the operating process of the designed device, the physical phenomena and processes that take place in it.
4. Acquire skills in the practical use of the device.
5. Knowledge of the importance of the device in the national economy, household use.

Today, there is a need to use the latest

information to ensure that the product of technical creativity is up to date. Therefore, in the process of developing creative technology, it is important to inform students about the latest achievements of science and technology, as well as socio-economic, environmental and energy issues.

Physics Circles It is important to pay attention to the following when using alternative energy sources devices in the development of technical creativity of students:

- To use students' attention for technical purposes in physical phenomena and processes taking place in the device under study;
- Give students examples of alternative energy sources used in everyday life;
- Discussion of the presented material on issues that is relevant to the use of technology in everyday life;
- To pay attention to the integration of practical work with the materials studied in physics, using devices of alternative energy sources;
- Organization of trainings using technical documentation on alternative energy sources, device animations, visual aids, mock-ups and models, equipment and tools available in the laboratory;
- Prospects for the development of alternative energy technologies, research in the field, a presentation on the latest achievements using modern techniques and technologies, roundtables with experts in the field.

Dryers, water driers, water heaters, greenhouses, solar-powered fruit storages, solar photovoltaic cells, solar concentrators, solar kitchens, solar ovens, wind generators, small hydroelectric power plants, biogas, biogas, etc. it is possible to make models and models made of plywood, wood, plastic by drawing a technological map of devices such as a retrieval device.

IV. Discussion

It is important to note that information about alternative energy sources provided to students is based on a specific system. Before giving information about the structure and operation of low-temperature devices based on solar energy, calculated from alternative energy sources, it is necessary to acquaint students with information about the structure and operation of the "Issiq quti (Hot Box)". The operation of many low-temperature solar-powered devices, calculated from alternative energy sources, is based on the operation of the “Issiq quti (Hot Box)”.

Prospects for the use of solar energy in the national economy have been developing rapidly in recent years in our country and abroad. As solar energy is an environmentally friendly energy, it is used in greenhouses, desalination, drying of fruits and vegetables, solar panels and other industries. One of the main challenges facing experts in the field of alternative energy today is to increase the efficiency of existing solar devices.

Focusing on the opportunities to develop students' technical creativity in the circle through alternative energy sources, we found it necessary to describe the types of solar dryers, their design and construction.

First of all, let's get acquainted with the physical content of the construction process. When the material is wet, they contain water molecules that characterize moisture, and during the drying process, this amount of water must be evaporated from fruits and vegetables, such as mulberries, apples, grapes, tomatoes.

But from materials, in order to evaporate water, they need to use this or that type of energy. The amount of energy expended depends on how the liquid (water) interacts with the material. Evaporation in the initial stages of the drying process is also based on Dalton's law, similar to open water surface evaporation, i.e.

$$W = \beta S(P_1 - P_n)\frac{760}{P} g/hour \quad (1)$$

In this formula: W is the amount of water that evaporates; β is the evaporation coefficient; S is the evaporation surface; P_1 is the saturated vapor pressure at the evaporation temperature; P_n is the partial pressure of vapor in the air; P - barometric pressure.

Between the saturated vapor pressure and the partial vapor pressure in the drying process of the materials is of great importance.

The effect of the relative humidity of the air on the drying process is as follows: the drying of the material results in the evaporation of water from this material, so the lower the relative humidity of the air, the faster the evaporation and the resulting drying time. Therefore, in drying chambers, an attempt is made to reduce the relative humidity of the air at the expense of ventilation.

The next thermodynamic parameter in the drying process is the drying potential. The following physical process occurs in the adiabatic evaporation of water due to the internal energy of the surrounding air.

1. Evaporated water gradually increases the partial pressure of water vapor in the air and the amount of vapor (relative humidity).

2. During evaporation, the air temperature decreases because the heat is dissipated due to the internal energy of the air.

3. At the same time, the temperature of the water (as well as the material) changes and becomes equal to the temperature of the wet bulb thermometer in the psychrometer. Hence, it is equal to the temperature of a wet bulb thermometer. Hence, the temperature of a wet bulb thermometer is the temperature at which water evaporates. The difference between the readings of a dry bulb thermometer and a wet bulb thermometer determines the ability of Δt to absorb (absorb) water vapor by air.

Therefore, this difference is called the drying potential and is expressed as follows:

$$\Delta t = t_q - t_h \quad (2)$$

Hence, the greater the drying potential Δt - the greater the evaporation of water in a given space, but when $t_q = t_h$ s= 100% (relative humidity one hundred percent) the construction process stops. It should be noted that the reading of a wet bulb thermometer is approximately half a degree lower than that of a real psychrometer of a wet bulb thermometer.

Another factor that plays an important role in the drying process is the drying mode. The drying mode includes the temperature, relative humidity and speed of the heat carrier (air). For example, the drying time increases with increasing relative humidity.

Some of the wet material placed in the drying chamber absorbs light that falls on the surfaces. Therefore, a partial radiation-convective method is also performed in the drying chamber. In convective heat exchange, air in the dryer also plays the role of a medium that simultaneously receives heat-carrying material

and water vapor. Since the relative humidity of the air plays an important role in the drying process, it is necessary to pay attention to the sources that form it.

The natural humidity of air in solar dryers varies for two reasons: the amount of water vapor in the outside air and the amount of water vapor released from the fruit and wet materials during the drying process. For example, in the initial stages of drying apples, 0.08-0.1 kg of water is released from one kilogram of wet fruit and passes into the chamber air. As a result, the relative humidity of the air in the chamber gradually increases.

Solar dryers have a characteristic feature of relative humidity control: if the chamber is constantly ventilated, the heat received by the solar energy is dissipated, and if it is constantly closed, the relative humidity increases and the construction process slow down. Therefore, most dryers are periodically ventilated.

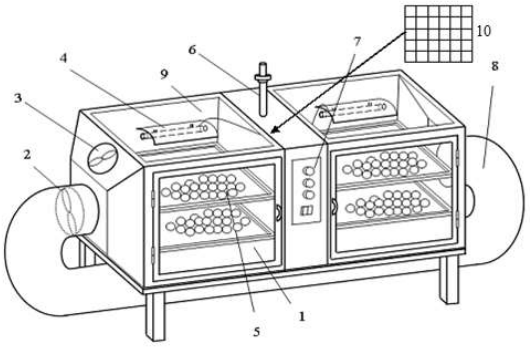
It should be noted that in the summer, during ventilation, the amount of heat passes into the chamber with outside air, albeit slightly. If we say that the amount of incoming air from the outside is L_0 and the heat retention in it is I_0, the total heat balance of the device will be as follows:

$$Q_{h.a.d} + LJ_0 = Q_1 + Q_2 + Q_3 + Q_4 + Q_5 \quad (3)$$

[h.a.d. – the amount of heat absorbed into the device].

In this equation: Q_1 is the amount of heat required to evaporate water from the material (fruit); $Q_2$is the amount of heat required to heat the material; Q_3 is the amount of heat leaving the dryer with air; Q_4 - the amount of heat transferred (transferred) to the environment during the day; $Q_5$is the amount of heat accumulated in the device.

The temperature-humidity regime in solar dryers mainly depends on solar radiation, outside temperature, air humidity, type of dryer and other factors. These factors vary throughout the day. Therefore, the control of the temperature-humidity regime of solar dryers is one of the important problems. The quality of dried fruits and vegetables depends on the temperature-humidity regime in the drying chamber, the initial processing of fruits and other effects. To solve this problem, scientists from Bukhara State University have created an automated solar fruit dryer that works continuously (Picture 1).



Pirture 1. Schematic diagram of the drying device.

1 - drying chamber, 2,3 - fans, 4 - reflector IR light lamp, 5 - pallet for products, 6 - contact thermometer, 7 - control panel, 8 - air flow rotating tube, 9 - glass layer, 10 photo batteries.

Let's get acquainted with the results of calculation of technical parameters of this device. The processes going on inside the device are controlled automatically. The maximum temperature inside the chamber was 620 ° C. In the recirculation mode, the

temperature difference across the chamber height was 4–60 ° C.

It was found that the speed of the heat carrier is 1-1.5 m per second, and the relative humidity is 35%. From 1400 to 1600 hours the temperature decreases to 30-340 C. naturally, at low temperatures, the rate of fruit set also decreases. An additional heat source (IR lamps) was used in the chamber to maintain the rate of fruit set. When the temperature drops below 350-400S, the thermostat connects the IR lamps. If necessary, the IR lamps can be connected to the mains at any temperature not exceeding 700 C using the regulator. IR lamps are used for continuous operation of the device.

The energy required to operate the device is achieved by converting solar energy into electrical energy using a photo batteries. This device differs from other types of devices by the high quality of dried fruits.

Information on the structure and operation of dryers operating at the expense of alternative energy sources will help to strengthen knowledge through the integrated teaching of topics in physics. It also serves to develop the skills of designing and making various devices in the circle sessions.

V. Conclusion

If the design and mock-up of various devices as above is initially carried out under the guidance of a teacher, students will be able to independently create various devices on the basis of modern technologies once their technical creativity competencies are sufficiently developed. This plays an important role in their development as specialists in the field of technology.

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