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IMPROVING THE CONTENT OF TEACHING SCHOOL PHYSICS USING TEACHING MATERIALS ON RENEWABLE ENERGY SOURCES

Abstract: The article provides methodological suggestions and recommendations for the formation of elementary concepts related to the school physics course and renewable energy sources. The article also cites classroom raids on knowledge, skills, and software production in renewable energy sources based on experimental results.

Key words: renewable energy sources, training materials, visual weapons, билим, skills and qualifications, school physics lessons.

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Introduction

One of the most global issues today is the energy issue, the urgency of which is that the energy issue is also interrelated with environmental issues. Therefore, in the educational process, it is advisable to acquaint students as much as possible with the problems of these issues and their effective solutions. In the teaching of school physics, the task is to select the appropriate teaching materials for science programs, in particular, to identify fundamental concepts related to alternative and renewable energy sources and their efficient, rational and economical use. In modern science and technology, energy sources are mainly divided into 2 types: conventional and alternative energy sources, depending on the amount of raw materials and their impact on the environment. There is a need for the effective use of these modern forms of energy, the constant formation of knowledge, skills and abilities in students about the achievements and challenges, their future prospects. Because the human way of life cannot be imagined without energy, that is, without modern energy

sources. Although the concept of energy is perfectly presented in the school physics course, its practical significance, types, laws, and reasons for its emergence are not sufficiently reflected. Opportunities for the formation of knowledge in the field of alternative and renewable energy sources in the 6th and 9th grades of the physics course of secondary schools are given. For this purpose, training materials on the physical basis of alternative and renewable energy sources were selected. Experimental and test groups were also separated from classes with the same number of students. The practical application of methodological and didactic developments developed for the pedagogical experiment in the teaching process was carried out in selected experimental groups. The pedagogical experiment was conducted in secondary schools No. 5 and 9 of Termez district of Surkhandarya region in the 2020-2021 academic year. Experimental work The teaching materials on the types of alternative and renewable energy sources corresponding to the topics in the physics program of 6th and 9th grades were

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selected (tables). In the experimental work, handouts on each type of renewable energy sources, the structure of demonstration models and interesting topics were developed. Curriculum materials were selected appropriate to the topics covered in the school physics program. The lesson also used interactive

methods and techniques, in particular, game methods. In particular, non-standard questions and tests were used in the teaching process to develop each student's ability to work independently. As a result, along with the independent work of students, the development of scientific and creative work skills was also affected.

Table 1. Use of teaching materials on alternative and renewable energy sources in the teaching of 6th grade physics

№	Topics in the science program	Training materials on alternative energy sources	Demonstration weapons and tools
1	The concept of work and energy	Basic concepts of energy sources in nature	Presentation, video, handouts
2	Types of energy. Power	Types of alternative and renewable energy sources	A3 format slides, pictures, crossword puzzles
3	Heat generating devices. Heat absorption	Types of thermoheaters and the principle of their operation	Geothermal device model, presentation, tests
4	Heat transfer in solids, liquids and gases. Thermal conductivity. Convection	Use of alternative energy sources in home heating systems and hot water generation	Model of a thermal heater for use in home heating systems
5	Radiation. The use of heat transfer in life and technology	Possibilities of using photovoltaic and thermoelectric devices in everyday life and in the national economy	Photoelectric device model, presentation, crossword puzzles, handouts
6	Electrification of bodies	Physical laws of electric current generation in solar cells	olar element sample, presentation, test and issues
7	The concept of electricity. Current sources	Use as electricity in alternative and renewable energy sources	Universal model of alternative energy sources, handouts
8	The importance of electricity in life. Simple electrical circuit	Possibilities of using mini solar photovoltaic devices at home and in areas without power supply	Mini photoelectric device model, presentation, videos
9	Electrical appliances in the apartment. Saving electricity	Use of energy-efficient appliances and devices in homes	Energy saving lamps, electric circuit, solar cell
10	Beruni and Ibn Sina's views on light phenomena	Physical bases of conversion of light energy into electrical energy	Presentations, handouts, videos

Table 2. Use of teaching materials on alternative and renewable energy sources in the teaching of 9th grade physics

№	Topics in the science program	Training materials on alternative energy sources	Demonstration weapons and tools
1	Scattering, reflection, and refraction of light	Laws of absorption of light on the surface of the solar cell	Light source, solar imitator, presentation, video, handouts
2	complete internal return	Methods and techniques for reducing the energy of light photons and the reflection coefficient on the surface of the solar cell, the formation of micronutrients	Model of solar photovoltaic device with concentrator, slides, videos
3	Lenses	Solar photovoltaic devices based on Fresnel lenses	6 W mini solar photovoltaic device model, presentations
4	Optical instruments	Application of optical devices (energy-saving greenhouses, led lighting lamps) to increase light	Energy-saving LED lamps, 60-watt rechargeable battery, simple electrical circuit, 20-

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		absorption in semiconductor solar cells	watt solar panel-based home model
5	Heliotechnics. Use of solar energy in Uzbekistan and its prospects	Modern designs of solar equipment, technical possibilities of using solar energy in Uzbekistan	Videos, presentations, handouts, crosswords, tests

The curriculum in the tables provides for the selection and incorporation of teaching materials in the content of alternative and renewable energy sources in accordance with the topics specified in the syllabus. Suggestions have also been made for the use of working demonstration models (tables) to build students' sufficient knowledge, skills and competencies in alternative and renewable sources. Based on the topics listed in this table, visual aids and equipment were prepared to be used in the lessons. For example, a model of the "House of the Sun" was developed to explain the process of converting solar energy from alternative energy sources. Because solar energy is the most efficient of the alternative energy sources. Other similar models, a biogas plant, a geothermal power plant, wind power plant models, and electrical circuits, were also prepared. Presentations on each type of alternative energy source were also prepared. From the Internet sites on alternative energy sources, videos on the physical

processes of formation of each type of energy and their practical application were selected. Additional handouts, tests, crossword puzzles, interesting questions and issues were developed to make the course more effective. In addition, pictures and tables were prepared in A3 format, reflecting the achievements, shortcomings and future prospects of the use of alternative and renewable energy sources in life, industry and space research. In order to conduct the teaching process effectively and meaningfully, interactive methods and techniques and exhibitions suitable for each topic were selected.

According to the statistics obtained, schoolchildren have developed sufficient knowledge, skills and competencies in alternative and renewable energy sources. It was also found that there are opportunities to increase the effectiveness of physics lessons and enrich their content on the basis of new teaching materials.

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